A LONGITUDINAL STUDY
OF
ACUTE RESPIRATORY INFECTIONS
IN THE UNDER-FIVE AGE GROUP
IN A RURAL AREA OF GOA

BY
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GOA UNIVERSITY
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Dissertion submitted for
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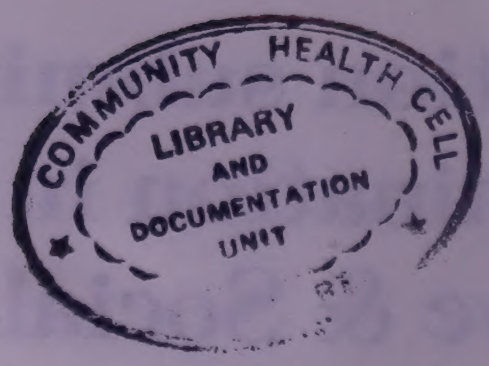

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INTRODUCTION

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1. INTRODUCTION

Acute Respiratory Infections (ARI) constitutes a group of conditions which are complex and heterogenous caused by a great variety of pathogens including bacteria and viruses.

The group includes influenza, sinusitis, acute otitis media, tonsillitis, epiglotitis, laryngitis, tracheitis, acute bronchitis, bronchiolitis and pneumonia. Others like measles, diphtheria, whooping cough and childhood tuberculosis are preventable with immunizations and have been included in the Expanded Programme of Immunization (EPI).

/It is estimated that 93% that is 14 million deaths of children under five years of age occur in developing countries of which one-quarter to one-third are due to ARI. Of these it is estimated that 0.8 million (18.6% of all ARI deaths) occur in first month of life.

According to Registrar General of India, ARI accounts for 14.3% of deaths during infancy and 15.9% of deaths between 1 to 5 years of age. The available community based studies indicate that ARI is a significant cause of mortality accounting for 20 to 29% of all deaths. Mortality rates associated with ARI in infants from the developing countries is 1000 per 100,000 live births.

/On an average, a child in urban area gets 5 to 8 episodes of ARI annually during the first five years of life. At this estimated rate, ARI is a considerable strain on our crowded hospital and health centres accounting for about 25 to 30% of

consultations and around 25% of total hospital admissions. The risk of an Indian child dying of ARI is 30-75 times more than that of his counterpart in developed countries.

In developed countries ARI are the cause of about 10 to 15% of all infant deaths. Data collected by WHO from 88 countries representing one-fourth of the world population indicate that there are over 6,66,000 deaths from ARI every year. On the assumption that mortality rates in non-reporting countries are similar to these 88 countries, it is estimated that about 2.2 million deaths, from ARI occur throughout the world every year.

India has endorsed the policy of providing health by adopting Primary Health Care in consonnance with Alma Ata declaration to achieve Health For All by 2000 A.D. One of the major targets is the reduction of Infant mortality rate from 95 to 60 per 1000 and pre-school mortality rate from 30 to 10 per 1000.

In order to achieve the above mentioned goals, efforts towards universalisation of immunisation, promotion of oral rehydration salts, provision of potable drinking water have already been initiated, but the above efforts still leave untouched a major cause of infant and child death that is Acute Respiratory Infection.

Until recently the ARI have received relatively little attention but many developing countries are now recognizing the magnitude of the problem and trying to seek ways to deal with it.

The government of India has launched pilot ARI control

programmes in small pockets in India, but the epidemiological data related to the magnitude and the risk factors of ARI in rural areas is scanty in India hence it is necessary to generate a thorough database through studies carried out in rural population.

This longitudinal study is an attempt made to study the epidemiological data related to the magnitude and the risk factors of ARI in a rural population.

AIMS AND OBJECTIVES

2. AIMS AND OBJECTIVES

2.1 To study the epidemiological factors responsible for ARI.

2.2 To determine the morbidity due to ARI.

2.3 To determine the mortality due to ARI.

2.4 To find out the seasonal variation of ARI.

2.5 To find out the case fatality rate of ARI.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Healthy child

Towards a healthier nation

Indoor Pollution

Poor Housing Conditions

Major risk factors conducive to ARI

Biomass: "High price" paid for cheap fuel

A prompt referral system: A means of preventing severe ARI related deaths.

3. REVIEW OF LITERATURE

Various environmental and host factors have been associated with an increase in risk of ARI morbidity and mortality.

The environmental factors are over-crowding, large family, high population density, poor housing, low socio-economic status, chilling, winter season, domestic air pollution caused by indoor wood burning, etc.

The host factors are early discontinuation or non-availability of breast feeding, poor nutritional status and absence of immunisation against specific respiratory illnesses such as measles, whooping cough and diphtheria.

Episodes Rate:

Community based studies show that ARI is indeed very common and constitutes a major cause of childhood morbidity. Episode rate per child per year of ARI is seen to vary from place to place depending on various climatic factors, urban/rural environment etc.

A longitudinal study by ***Datta Banik ND et al, (1969)***, in an urban area showed that a child during the first five years of life suffers from 5 to 7 episodes per year of respiratory disease.

Kumar V, (1987), stated in his study an overall number of episodes per child per year as 3.47. 3.9 per child was the ARI morbidity reported by ***Sharma V et al, (1979)***.

Gulati PV, (1977), reported that the morbidity rate was 2.2 per child per year. In an urban area of Punjab, ***Gupta KB et al, (1980)*** noted the morbidity rate as 2.5 per child per year. An ARI morbidity rate of 1.3/child/year was noted by ***Walia BNS et al, (1988)***. The average duration of the episode was 6 days.

The episode rate of ARI is seen to be lower in rural areas in comparision to urban areas. ***Datta KK, (1989)***, too stressed that the incidence of ARI was higher in urban areas as compared to rural areas.

A study carried out by ***Aggarwal DK and Katyar GP, (1981)*** noted that incidence of morbidity and mortality was higher in urban slums and rural children as compared to urban group.

Data from Urban hospital show that ARI is responsible for 12.4% of infant deaths and 18.8% of deaths among 1-4 years. The similar rate for rural areas are 14.8% and 22.4% respectively. ***Leowski J, (1986)*** also states that children from urban areas experienced lower mortality then rural children.

In a prospective case study conducted in a rural area of Bullab garh block (Haryana), ***Reddiah VP and Kapoor SK, (1988)*** found that there were 3.67 attacks of ARI per child per year. The percentage of moderate and severe attacks in their study were 14.7% of the total ARI attacks.

Age:

Acute Respiratory Infections most commonly occur in the first year of life, followed by 1 to 4 year age group. This

was noted in a study carried out in urban Delhi by ***Datta Banik ND et al, (1969)*** where the incidence was 81/1000 during the first year of life and then 68,67,67 and 37/1000 during subsequent 4 years.

It is estimated that 0.8 million (18.6% of all ARI deaths) occur in first month of life/ ***Garenne M et al, (1992)***

Palwari AK et al, (1988) noted in the hospital based report that majority of the ARI cases were infants.

Avila MM et al, (1989) in their study found that 3-8 months old age group had highest frequency of ARI and accounted for 56% of total cases. Not only is there increased frequency of ARI episodes in infants but mortality of ARI is also more. ARI accounts for 14.3% of deaths during infancy & 15.9% of deaths between 1 to 5 years of age.

The study carried out in rural Haryana by ***Kumar V & Kumar L, (1983)*** and in semi-urban areas of Vellore by ***Kamath KR et al, (1969)***, showed distinctly, higher ARI morbidity between the age of 1-2 years of age.

<u>Sex</u>:

Walia BNS et al, (1988) found no significant difference in the ARI frequency between boys and girls/ ***Datta KK, (1989)*** too observed no difference with regard to ARI on the basis of sex.

Other studies carried out by ***Narian JP & Sharma T.D., (1987), Narian JP (1987);*** and ***Narian JP and Sehgal PN, (1987)*** noted that males are affected more than females with M:F ratio of 1.7:1

Also in a hospital based report *Patwari AK et al, (1988)* noted that males are affected more than females, the ratio being 1.8:1.0.

Birth Order:

Generally it is seen that the first child usually gets more attention and care. As the number of children increase, the mother has less time to look after them. Also, with increasing family size there is a constraint on the financial resources.

Therefore, children born of a higher birth order have a tendency to develop malnutrition and infection.

Gupta S. et al, (1976) showed that the frequency of morbidities was significantly high after the second child.

Immunisational Status:

Four respiratory illness such as measles, diphtheria, whooping cough and childhood tuberculosis are preventable by immunisation. The lack of childhood immunisation history against these therefore, constitutes an important risk factor. Pneumonia is a common complication associated with measles. Many antecedent viral infection seem to play an important role in the invasion of the human host by bacterial pathogens present in the oropharynx.

Prof. Jacob (1989) in his paper 'Role of Immunisation,' stated that routine vaccines for prevention of diseases like diphtheria & measles have an impact on ARI morbidity and

mortality. Without immunisation it is said that an average of three out of every hundred children born will die from whooping cough.

Prat DS, (1985) stated that at global level, out of an estimated 2 million deaths from measles and its complications, about 1/3rd i.e. 0.7 million were caused by pneumonia. In India, every year an estimated 16 million pre-school children suffer from measles and 200,000 die from the disease and about 30-50% from an associated pneumonia as mentioned by ***Steinhoff MC and John JT, (1982)*** and ***John JT, (1983)***.

Singhi S and Singhi P, (1985) by the estimate suggested that measles accounts for 2.3 - 6.0% of all ARI episodes, 5-40% of all pneumonia related mortality in children under five years of age.

The community based data from Nepal shows that measles accounted for 9.4% of all ARI episodes and 41% of all moderate and severe ARI episodes. This was noted by ***Pandey MR et al, (1985)***. The relative risk of ARI among children due to non-compliance with childhood immunisation is 1.29 (CDC).

It has been estimated that an effective measles immunisation programme using currently available vaccine strains and covering 75-90% of all children by 9-11 months of age will reduce measles incidence by 51-68% therefore a successful immunisation programme covering at least 80% of all children under five years of age is likely to reduce the total ARI morbidity by 1.5-4% moderate to severe ARI morbidity by 2.5-30% and ARI mortality by 5-20%, as mentioned by ***Feachhem RG and Koblinsky MA, (1983)***.

The WHO estimates state that the ARI complications of measles accounted for 0.48 million deaths (11% of ARI deaths and 55% of all measles deaths) and that the ARI complications of pertussis accounted for 0.26 million deaths (6% of ARI death and 72% of all pertussis deaths) ***Garenne M et al, (1992).***

Birth Weight:

Babies with a low birth weight (LBW) present unique problems pertaining to their survival.

They are more prone to death from pneumonia and ARI may be responsible for 20-30% of total infant deaths but the information on precise role of ARI as a cause of infant death amongst LBW babies is scant. This was noted by ***Datta N, (1987).***

It is estimated that LBW may contribute upto 60% of total infant mortality rate ***(Bhargava SK and Mittal SK, 1982).*** The fact of increased mortality rate in LBW ranges is well established.

Bhargava SK et al, (1979) in an urban cohort followup of 421 babies from 0-6 years reported a higher incidence of ARI upto the age of 3 years. Proportion of babies between 2.0 kg and 2.0-2.5kg birthweight range suffering from ARI upto the age of three years was higher as compared to those above 2.5 kg birthweight range.

Bhakoo ON (1987), reported in his study that lower the birth weight of babies, higher are his chances to develop

infection.

In a rural cohort study, by ***Bhakoo ON (1985)***, ARI deaths amongst LBW babies were significantly higher (7.1%) as compared to normal birth weight babies (0.9%). A total of 79% contribution to overall ARI mortality come from LBW babies as compared to their normal counterparts. This is an indirect evidence to suggest the extent of severity of ARI amongst LBW babies.

In a study in UK by ***Crosse VM (1972)*** mortality per 1000 live births during infancy was 26.4% among LBW children compared to 6.8 among birth weights of greater than 2.5 kg giving a risk of 3.9.

In a study carried out by ***Rao S et al, (1979)*** it was seen that mortality rate was higher in infants weighing less than 2.3 kg and also the chances of surviving an illness are distinctly better with an higher birth weight. Broncho-pneumonia and prematurity were the main causes of morbidity and mortality.

Bhargava V et al, (1970) in their study found that mortality was inversely related to the birth weight.

In 1979, ***Bhargava SK et al*** observed in their study that children with birth weight 2.5 kgs suffered from higher morbidity rates in preschool years than did the normal weight children, but there was no difference after five years of age. Respiratory illness and diarrhoea were the prime causes of morbidity and mortality in these children.

In contrast, findings of a study carried out by ***Vandernberg BJ, (1968)*** reported no difference in the incidence

of respiratory illness amongst LBW and NBW babies upto the age of 2 years. The illness reported per 100 children was 145.9 and 130.3 in LBW babies in contrast to 153.2 and 130.6 in NBW babies during the first and 2nd year respectively.

Similar results have been reported in another rural community based cohort study carried out by ***Datta N et al, (1987)***. However the duration of moderate and severe episodes was longer amongst LBW babies as compared to NBW babies.

Maturity:

Vulnerability to infection increases in preterm babies or, small for dates babies due to their poor immunological status. Amongst preterm, 13.4% deaths were attributed to pneumonia during the first three months of age.

Preterm babies suffered from a higher attack rate. This was noted by ***Bhalla JN, (1977)***.

Bhargava SK et al, (1974) found that besides gestational age, growth, aberration-in-utero were reported to affect adversely ARI morbidity, since SFD babies had higher attack rate in comparison to preterm babies (11.3% V/s 5.5) upto the age of 6 months.

A higher frequency of ARI in SFD babies are compared to those with appropriate for gestational age (AGA) was reported in 50 babies in each group from 0-6 months age. Respiratory infections amongst SFD babies were also of a longer duration as compared to AGA. This was noted by ***Srivastava AK et al (1978)***.

Bhargava V et al (1970), in their study found that

mortality in babies born before 37 weeks gestation was 43.2% while it was only 11.1% in babies born after 37 weeks or more when mortality was co-related with the gestational age irrespective of birth weight. It became evident that mortality was almost 4 times in babies with gestational age less than 37 weeks, compared with those with the gestational age of 37 weeks or more.

Breast Feeding:

Breast milk and its anti-infective properties are well documented. It contains various factors like secretory Ig A, lysozymes, specific inhibitory substances for viral infection and anti-staphylococcal factor. These humoral antibodies and other host resistance factors present in human milk play a crucial role against both viral and bacterial agents. *(Ghai OP, 1989).*

Several studies eg *Winikoff B (1981); UNICEF (1981);* have recognised that breast feeding reduces the risk of ARI morbidity and mortality.

Two prospective studies in India by *Chandra R K, (1979); Kumar V et al (1981),* have shown that the risk of ARI in bottle fed infants are more, specifically after 4 months. The protection offered by breast feeding against moderate to severe ARI (i.e. ARI requiring hospitalisation or broncho pneumonia/bronchiolitis or bronchitis) is more definite. The median relative risk of moderate to severe ARI is 2.5 times higher in bottle fed infants as compared to breast fed ones.

In a study carried out by *Kumar V et al (1982)*, at Ambala

it was seen that infants who were breast fed had significantly lower attack rates than those who were given bottle feeds.

At any age, a child who is malnourished is likely to become seriously ill or die because of pneumonia. By giving an infant breast milk alone for at least the first 4-6 months of life helps greatly in protecting the infant against infection.

Bottle-fed babies it is said, have on an average twice as many bouts of pneumonia as compared to breast fed babies *(WHO, 1991)*.

With the practice of breast feeding, the risk of admission to hospital for respiratory virus infection have been brought down by half as mentioned by ***Pullan C et al (1980)***. Also ***Woodward A et al (1990)*** found that children who were breast fed suffered less respiratory illnesses than those children who were only bottle fed.

Several other studies by ***Dugdale AE, (1971); Adenbonojo FO, (1972); Frank AK et al (1982)*** have shown little or no association between breast feeding and overall prevalence of ARI especially after controlling for family and social factors.

<u>Feeding during illness</u>:

In a study carried out by ***Kapoor SK et al, (1990)*** it was seen that 89.60% of the mothers continued breast feeding or feeding during respiratory illness.

Khallaf N, (1992) in a study carried out in Egypt noted that mothers continue to breast feed or feed their children during ARI.

Respiratory infections are first treated at home with water flavoured with sugar and spices such as fenugreek, mint, cumin and aninse.

It was seen that in Bolivia, ***(Wilson R, 1992)*** mothers often treat the children with traditional herbal teas (agbo) or home made remedies for cough.

Family Size:

Family size has been shown to influence the nutrient intake of families of low socio-economic group. In a study carried out by ***Kumar A et al, (1976)***, families with 4 or more children were observed to have poor intake of calories and proteins than families with 3 or less children.

As a result the prevalence of PEM among children was found to be considerably high in larger families having four or more children as compared to smaller families with three or less children.

The prevalence rates of respiratory infections was more in larger families than the smaller ones. The findings indicated that one-fourth of the total infections of respiratory and gastro-intestinal nature among children could be avoided by just limiting the number of children to three or less in families of poor socio-economic status.

Gupta S et al, (1976) showed that there was significant direct relationship between family size and PEM, vitamin deficiencies and common infections in their study carried out on children below age of 15 years.

Socio-Economic Status:

Income directly relates to purchasing power of nutrients and is a detriment of housing conditions, environmental sanitation and aquisition of education and knowledge amongst others of child care. Income also determines the availability of medicare and is one of the factors determining the socio-economic status of a person. Health depends considerably upon the capability of the families economic resources to meet the essential needs of good nutrition.

Gupta S et al (1976) in their study reported that families with lower income had more number of children and the percentage frequency of illness revealed that 55.5% of children in lowest income group were frequently ill as compared to 15% in high income group. Throat and the ear infections was noted with greater frequency in children of lower income group. Also larger number of children in low socio-economic group died.

Literacy/Educational Status of the parents:

Leowski J (1986), in his study found that childhood mortality was twice as high when mothers had no education compared to mothers with elementary education and four times as high when compared to mothers with secondary education.

Walia BNS et al (1988) reported that parent educational status did not show any co-relation with ARI episodes per child per year.

Type of House:

In rural India, the houses that are seen are mainly three types ie kutccha, where walls are made of plain mud or pucca where cement is used or the mixed type. Kutccha houses tend to have dampness which is known to facilitate respiratory infections.

Agarwal DK and Katyar GP, (1981) found that the morbidity incidence was significantly higher in those children who lived in kutccha or mixed houses as compared to those living in pucca houses.

Gupta S and Krishnmoorthy KA, (1970) also noted a higher frequency of illness ie 76.5% in those living in kutccha roofing as compared to a frequency of illness of 60.1% in those with pucca roofing.

Higher frequency of illness with poor housing was seen by ***Spence et al, (1954)*** and ***Datta SP and Gopal TK, (1965)***. ***Gupta S et al, (1976)*** also noted frequent illness in those families with kutccha housing.

No significant variation in the ARI attack rate was found when the data was analysed with respect to types of houses ie kutccha or pucca by ***Walia B.N.S. et al, (1988)*** in their study.

Overcrowding:

Among factors that play a crucial role in the spread of infection is overcrowding in the home. With the system of joint family common in India and relatively poor socio-economic situation, it is expected that spread of respiratory pathogens would be facilitated under these conditions. Of

several social factors, overcrowding in the house (five members in one or two rooms) was found to be the one which was intimately related to the high incidence of respiratory illness. This was noted by ***Brimhle Combe FSW et al (1958). Gwatney JM et al, (1975);*** observed that in continued close contact in the more crowded families higher secondary attack rates were seen.

Kumar V et al (1982) in India show that there is a greater likelihood of ARI in large families than those with fewer family members. The relative risk of ARI among children due to overcrowding was 1.24 (C.D.C.).

Wallia BNS et al (1988), mentioned that no significant co-relation was seen between ARI attack rate and number of rooms per member in the house.

Domestic Animals:

Domestic animals, usually come in close contact with the children during play.

In a study carried out by ***Wallia BNS et al (1988),*** no significant variation was when data was analysed in respect to presence of domestic animals.

Indoor Pollution:

Of the principal categories of indoor pollution research in developing countries has focussed on combustion generated pollutants and principally those from solid fuel fired cooking and heating stoves.

Such stoves are used in more than half the worlds

households and have shown in many locations to produce high concentration of particulates, carbonmonoxide and other combustion related pollutants. This was noted by ***Chen BH et al, (1990).***

Pillotto LS and Douglas RM, (1992) mentioned that nitrogen dioxide is produced from the combustion of fossil gas fired appliances and is also a component of tobacco smoke. It has been shown to be toxic to the respiratory tract in experimental animals. A number of recent studies have suggested that children exposed to significant levels of nitrogen dioxide in the homes may be more susceptible to respiratory illness than children exposed to normal ambient levels. The inhalation of polluted air causes damage to tracheo-bronchial mucosa and bring about ciliary paralysis which might increase susceptibility to severe infection.

Respiratory distress symptoms have been associated with use of smoky fuels in West India, Ladakh and in several Chinese studies among the different age groups. ARI in children has been associated with Nepali household smoke exposures as noticed by ***Chen BH, (1990).***

The results of the study by ***Wafula EM et al, (1990)*** carried out in houses where most of the cooking was done on open fires using firewood and crop residues as fuel, indicated that exposure to excessive levels of toxic pollutants in smoke from biomass combustion are likely to occur especially among pre-school children and women.

The major sources of indoor pollution heating and cooking devices, chronic pollution seems to lead to an increase in the

prevalence of upper and lower respiratory airway symptoms.

In young children early exposure to pollution contribute to the development of chronic airway disease later in life. ***Dales RE et al, (1991); Neas LM et al, (1991) Koo LC et al, (1990)*** reported in their studies that the incidence and prevalence of all respiratory symptoms were consistently higher in homes which reported moulds or dampness and showed an increase in household nitrogen dioxide.

Valia BNS et al, (1988) report that the ARI attack rate in the children from those families which were using both kerosene as well as solid fuel (wood and cowdung) for cooking was found to be significantly higher (1.42 episodes per year) than those where only solid fuel was being burnt (1.01 episodes per year)

Pandey MR et al, (1989) showed an increase in total as well as moderate and severe ARI episodes in infants with an increase in average time spent daily near the fireplace. Those exposed for less than one hour had 2.1 episodes per child in contrast to 3.6 episodes per child in those exposed for four hours or more.

Honicky RE et al, (1983) in a historical prospective case study found that 84% of 31 children whose homes were heated by wood burning stove had at least one respiratory symptom whereas only 3% of 31 matched control children whose homes were heated by other means had respiratory symptoms

Study conducted in the Gambia by ***Pandey et al, (1989)*** failed to show a relation between ARI and indoor pollution.

Dijkstral et al, (1990) in their study quote that the

development of respiratory symptoms over time was not associated with indoor exposure to nitrogen dioxide. No relationships were found between exposure to kerosene stoves, wood stoves and respiratory illness as per the study carried out by ***Azzizi BH and Henry RL, (1991).***

Nutritional Status:

Synergistic action between malnutrition and infections is well recognised as the presence of one predisposes and aggravates the other. Malnutrition lowers the systemic and local immune and defence mechanisms, decreases respiratory muscle, and weakens the cough reflex. These factors together with impaired regeneration of respiratory epithelium increase the susceptibility to, and persistence of acute respiratory infections. In the malnourished child, there is significant impairment in immunity of cellular type which increases susceptibility to ARI and secondary infection. As the secretory Ig A is generally reduced, the recovery from infections is delayed and infections tend to be severe in malnourished subjects.

The complications in a malnourished child are more frequent and the prognosis more grave, for instance, also pneumonia may be 20 times more frequent in malnourished child as compared to normal nourished children.

Moderately and severely malnourished children have 15-19 times increased risk of acquiring moderate and severe ARI and have a 4-13 times increased risk of ARI associated deaths.

James JW, (1972) in his study found that bronchitis

occurs three times and pneumonia 19 times more frequently compared with normal children.

Vitamin A deficiency defined as clinical xerophthalmia also predisposes children under five years of age to 1.8 times increased risk of ARI ***(Sommer A et al 1984)***. The association of higher incidence of ARI with xerophthalmia may be because Vitamin A is essential for the functional integrity of the mucosa.

Available data examining the relationship between the ARI and malnutrition in children under five years of age suggests that the overall incidence of ARI is not increased in malnourished children. However ARI episodes in these children are of longer duration and increased severity and are associated with high mortality.

Seasonal Variation:

In developed and developing countries respiratory infection usually occur more frequently during cold weather than any other season, twice or three times as common in winter (CDC). This is specially true in north India.

Reddiah VP and Kapoor SK, (1988) in their study noted that the attack rate of ARI was lowest in June & highest in January, overall the attack rate was higher in winter months than in summer months showing a distinct seasonal variation.

The morbidity of ARI followed a definite seasonal pattern in the study carried out by ***Patwari AK et al, (1988)*** where the highest incidence of ARI was seen between September to December.

Similar seasonal variation have been found in studies carried out by ***Venkatesh S and Bansal RD, (1986); Gulati PV, (1965); Bhargava SK et al, (1979).***

In Calcutta, however a peak incidence was seen before enduring monsoon season as there is no extreme of heat and cold and in monsoon it is comparatively cooler. ***Narain JP and Sharma TD, (1981);*** found that ARI occurred most frequently in post-monsoon period (with highest in the month of August) but in comparison less frequent in winter month. Maximum admissions for ARI were during the post monsoon period (July to October) when about 45% of the total patients were admitted.

Mortality/Case Fatality Rate:

In the study carried out by ***Reddiah VP and Kapoor SK (1988)***, out of 141 children who died in the year under study, 32 died of ARI giving a proportional mortality rate of 22.6%. 22.5% infants and 22.9% in post-infancy period.

Reported fatality rate for hospitalised cases range from 5-10%. Proportional mortality is highest in children between 1-4 years of age followed by children less than 1 year of age (C.D.C.) ***Avila M, (1989)*** found that the case fatality ratio due to ALRI was low (0.98%)

Case fatality rate in a study carried out by ***Patwari A et al, (1988)*** in children less than 5 years of age was highest with post-measles ARI (39.72%); pneumonia (18.9%) and acute laryngotracheo bronchitis (14.41%). Case fatality rate was

(10.5%) as per the study carried out by ***Narian JP and Sharma TD (1981)***.

Khan et al, (1990) in their study report that the ALRI specific mortality rate among children less than five years of age in 31 intervention villages was 6.3 deaths/1000 children/year compared with 14.4 in 7 control villages.

MATERIALS AND METHODS

$$v = mR$$

4. MATERIALS AND METHODS

The present study is a longitudinal study of Acute Respiratory Infection among the under five children in a rural area.

4.1. Study Area:

The proposed study was carried out in a rural area in South Goa, which included six villages namely Mandur, Dongrim, Azossim, New-Azzosim, Neura-o-grande and Neura-o-pequeno which are covered by the Mandur sub-centre.

The twenty bedded Rural Health-cum-Training Centre (RHTC) attached to the Department of Preventive and Social Medicine, Goa Medical College is situated in heart of the area and caters to the health needs of the population under its jurisdiction. All the cases requiring specialist care are referred to the Goa Medical College and hospital.

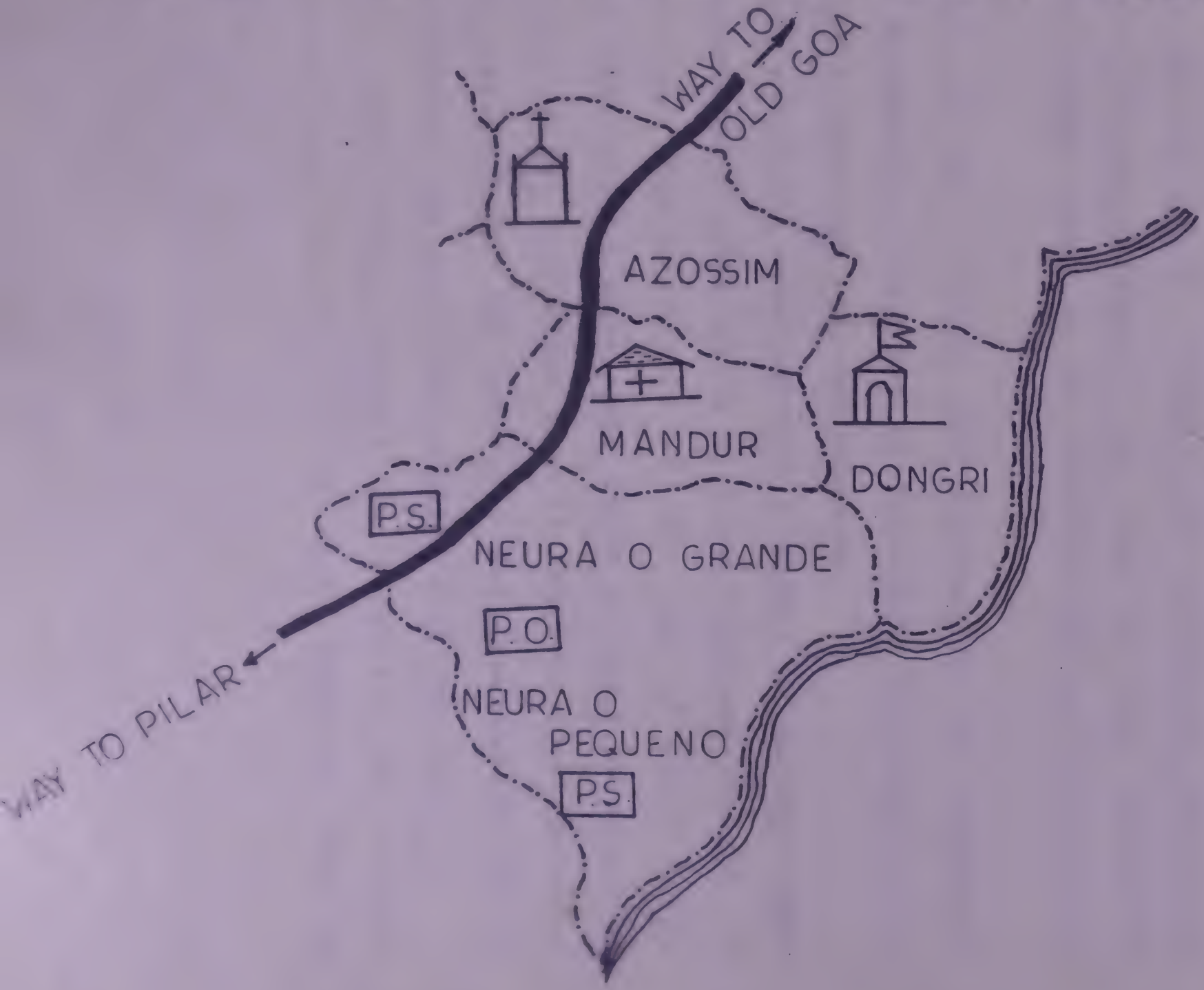
Geographically, this study area is situated 18 Km from Panaji, the capital of Goa and 14 Km from the Goa Medical College and Hospital, Bambolim.

4.2 Selection of the study population:

There are five sub-centres covered by the RHTC namely, Mandur, Carambolim, Curca, Goa-Velha and Agassiam. The study has been carried at the sub-centre Mandur having a population of 6,235 (as per the census cards maintained at the RHTC Mandur and Neura Panchayats).

With an average birth rate of 14.5 per 1000 there were

MAP OF THE STUDY AREA IN GOA



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- R. H. C. MANDUR
- MAIN ROAD
- VILLAGE BOUNDARY
- CHURCH
- TEMPLE
- RIVER
- P.O. POST OFFICE
- P.S. PRIMARY SCHOOL

Villous vessel Eye examination.

Anemia due to non-hepatic.

9. Narcissism Chart

450 under-fives. However only 390 children were included in this study as 57 children had dropped out because of migration and 3 children had expired. These under-five children identified on the first of August nineteen ninety two were taken as the study population.

4.3 Methodology:

A proforma was prepared after studying the available literature on the subject. A pilot survey was conducted in about 50 families in the village of New Azzosim to assess the suitability of the proforma. It was finalised after making the necessary changes based on the experience gained by the pilot study.

Since all the villages were numbered by the respective village Panchayats, there was no difficulty in locating the houses and a ward-wise list was prepared.

Every child was examined once a month; by paying a home visit (accompanied occasionally by a multi-purpose worker). If the child was not available at the time of visit three repeated home visits were made after a weeks duration to contact the child. Even after this if the individual selected was not available for the interview and examination due to various reasons, the child was excluded from the study.

After establishing a rapport, the mothers of the subjects were interviewed mostly in the local language that is Konkani.

4.4 Tools of data collection:

Detailed history was obtained and recorded on the pre-tested proforma. During the first visit, the baseline data obtained was noted in the proforma which had the following schedules:

Schedule I :

It consisted of personal data that is Name of the child, Names of the parents, Address, Age and Sex of the child. The age of the child noted at the beginning of the study was taken into account for the sake of convenience.

Schedule II :

It consisted of history of factors known to influence ARI mainly, Birth Order, Birth weight, Feeding practices, Socio-economic status, Literacy of the mother, Living conditions, Fuel used for cooking, Type of house and flooring etc.

Schedule III :

It included the morbidity profile which had three sub-divisions.

i) Symptomatology

ii) General Examination

iii) Systemic Examination.

4.4.1 Symptomatology:

Symptoms suggestive of ARI were enquired for i.e. cough, nasal congestion,/blockage, running nose, throat pain, fever,

rapid breathing, inability to take feeds, in drawing of chest, ear-ache.

4.4.2 General Examination:

Weight of the child was noted on a spring balance with minimum clothing on. If the child was unable to stand then the weight of the mother with the child and the weight of the mother alone was noted. The difference between the two was taken as the weight of the child. The nutritional status of the child was assessed.

Throat was examined for any congestion using a torch-light and a tongue depressor. Any sub-mandibular lymphadenopathy was looked for and the ears was examined for any discharge.

4.4.3 Systemic Examination:

The respiratory system was examined by Inspection, Palpation, Percussion and Auscultation method. No laboratory investigations were carried out as they were operationally not feasible.

On the follow up visits every month, history of episodes of ARI occurring during previous 30 days including the day of the visit was obtained. If the answer was in the affirmative, history regarding the treatment received by the child, course of disease etc. was obtained and the severity of the episode was assessed.

The child was then examined for signs of ARI. Based on the symptoms and signs the episodes were sub-divided into

mild, moderate and severe types.

Data collected was analysed and tabulated to find out the epidemiological factors responsible for ARI, the morbidity and mortality due to ARI and the seasonal variation of ARI.

4.5 Interpretation of the data:

4.5.1 ARI: is defined as "Any episode of acute symptoms and signs resulting from infection of any part of the respiratory tract its structures including para nasal sinuses, middle ear and pleural cavity.

4.5.2 Episode of ARI: "A new episode of ARI was considered as are occurring after a period of 10 days." (as per ARI News 20:1 Aug 1991)

4.5.3 Severity of ARI episode: They were divided into the following based on various criteria.

4.5.3.1 Mild ARI:

Cough

Blocked/running nose

Ear Pain/discharge

Hoarseness of voice.

4.5.3.2 Moderate ARI

Rapid breathing (Respiratory Rate (RR) 50/min)

Difficulty in feeding

Wheezing

Acute Ear Infection

4.5.3.3 Severe ARI:

Visible Rib/chest indrawing/very rapid breathing (RR 60/min)

Inability to drink

Stridor in calm state.

Convulsions

Altered consciousness/drowsiness.

4.5.4 Birth Weight: (as per Text Book of Pediatrics by OP Ghai)

4.5.4.1 Low birth weight : Birth weight < 2.5 Kg.

4.5.4.2 Normal birth weight: Birth weight between 2.5 Kg - 3 Kg

4.5.4.3 High birth weight : Birth weight > 3.5 Kg.

4.5.5 Maturity: (as per Text Book of Obstetrics by Dutta)

4.5.5.1 Preterm : Period of gestation < 37 weeks.

4.5.5.2 Term : Period of gestation 38 to 42 weeks.

4.5.5.3 Post-term : Period of gestation > 42 weeks.

4.5.6 Immunisational Status: (as per EPI)

4.5.6.1 Completely Immunised : A child less than one year of age was said to be completely immunised if he/she had received the primary immunisation consisting of 1 dose of BCG; 3 doses of OPV; 3 doses of DPT; 1 dose of Measles as per the

immunisation schedule. A child between 1-4 years should have received in addition to the primary immunisation, 1 booster of DPT and 1 booster of DT as per the immunisation schedule to be called completely immunised.

4.5.6.2 Incompletely immunised : If a child had received any one or more of the above but less than complete immunisation, he/she was said to be incompletely immunised.

4.5.6.3 Not immunised at all : If a child had received none of the above.

4.5.7 Nutritional Status: Nutritional grading was done as per the classification of the Indian Academy of Paediatrics i.e.

4.5.7.1 Grade I : 71-80% of Harvard standard

4.5.7.2 Grade II : 61-70% of Harvard standard

4.5.7.3 Grade III : 51-60% of Harvard standard

4.5.7.4 Grade IV : 50% of Harvard standard

4.5.8 Socio-Economic Classification: It was based on Kuppuswammy classification (Text Book of PSM by Mahajan and Mahajan) which included:

4.5.8.1 Education:

i)Professional 7

ii)BA/B.Sc. degree 6

iii)Primary High School 5

iv)Higher Secondary Certificate .. 4

v)Middle School 3

vi)Primary School 2

vii) Illiterate 1

A=_____

4.5.8.2 Occupation:

i) Professional 10

ii) Semi Professional..... 6

iii) Clerical/shop owners 5

iv) Skilled Workers..... 4

v) Semi skilled workers 3

vi) Unskilled workers 2

vii) Unemployed 1

B=_____

4.5.8.3 Income:

i) Above 2000/mth 12

ii) 1000 - 1999 10

iii) 750 - 999 6

iv) 550 -749 4

v) 300 - 499 3

vi) 101 - 299 2

vii) 100 1

C=_____

Total Score = A + B + C = _____

26 - 29 I Upper

16 - 25 II Upper Middle

9 Animals

11 - 15	III	Lower Middle
5 - 10	IV	Upper Lower
< 5	V	Lower

4.5.9 Over-crowding: was judged based on the accepted standards in terms of floor space. (Text Book of PSM by Park & Park).

110 sq ft or more	2 persons
90 - 100 Sq ft	1-1/2 person
70 - 90 sq. ft.	1 person
50 - 70 sq. ft.	1/2 person
Under 50 sq. ft.	NIL

(A baby under 12 months was not counted; children between 1 to 10 counted as half a unit).

4.6 Analysis:

Data collected was tabulated and analysed by applying appropriate tests of significance, with statistical guidance.

4.7 Health Education:

Health Education was imparted to the mothers regarding:

i) Early recognition of signs of pneumonia.

ii) House hold measures taken to treat mild ARI episodes.

iii) When Hospital care is necessary.

4.8 Limitations of the study:

1) This study was conducted in a rural population in Goa. It will not be applicable to the general Indian rural population. Hence, it should be viewed accordingly.

2) The children born during the study period were not included in the study population.

3) The history of the mother was solely relied upon in the follow up visits which were once a month and therefore there could be an error in recall and the milder episodes may have been forgotten.

OBSERVATIONS AND DISCUSSION

5. OBSERVATION AND DISCUSSION

In this study it was noted that a child suffered from 1.3 episodes of ARI per year. This finding is analogous to that of the study carried out by ***Walia BNS et al, (1988)*** who reported an ARI morbidity of 1.3 per child per year. ***Datta Banik ND et al, (1969)*** too, observed an ARI episode rate of 1 to 1.3 per child per year.

However some studies have reported a higher number of ARI episodes per child per year for eg. the ARI morbidity rate in a study carried out by ***Kamat KR et al (1969)*** was 6 per child per year.

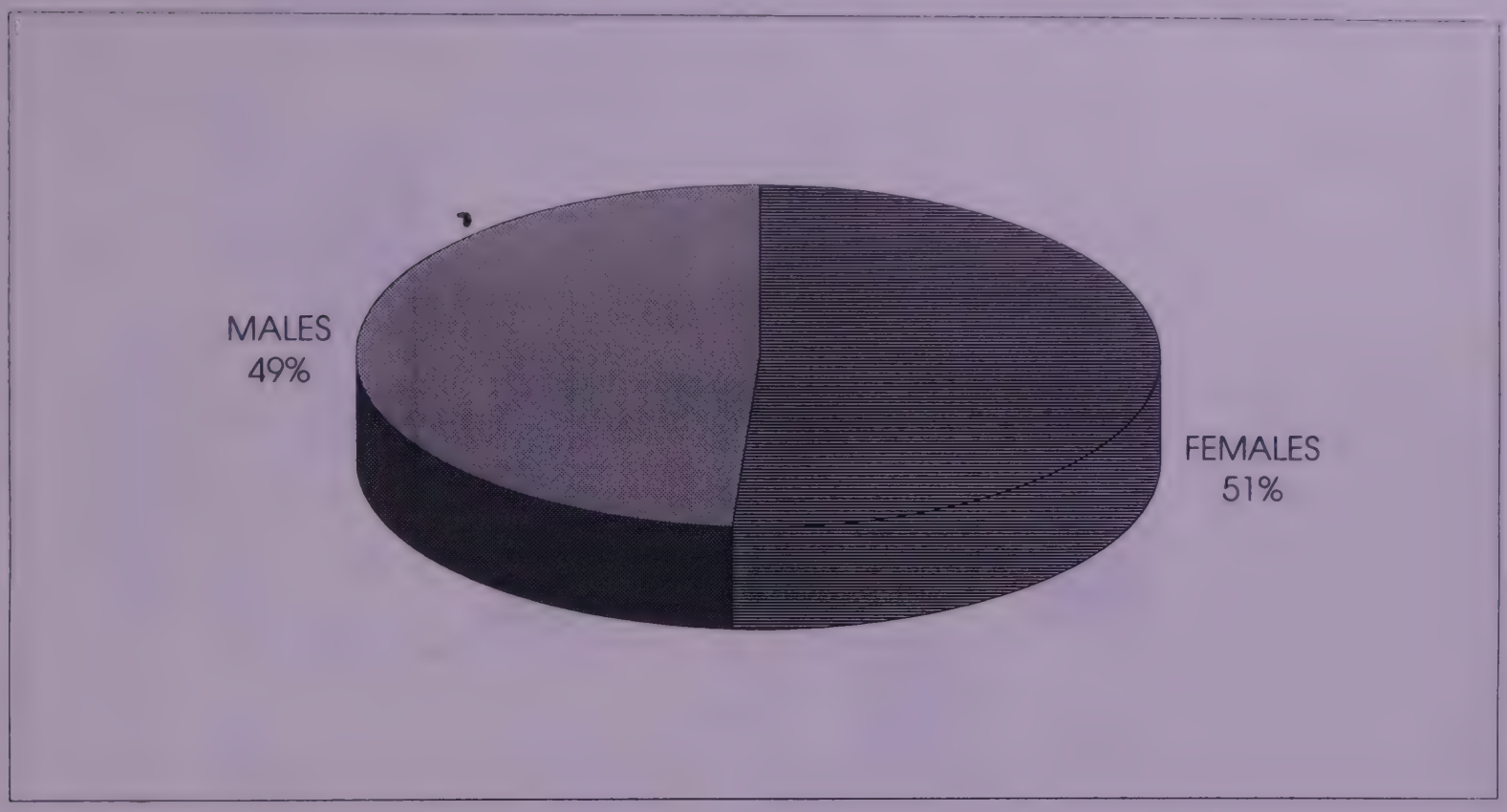
The low episode rate in this study could be due to various factors like, high literacy status of mother, good immunisation status of the child etc.

Table I :

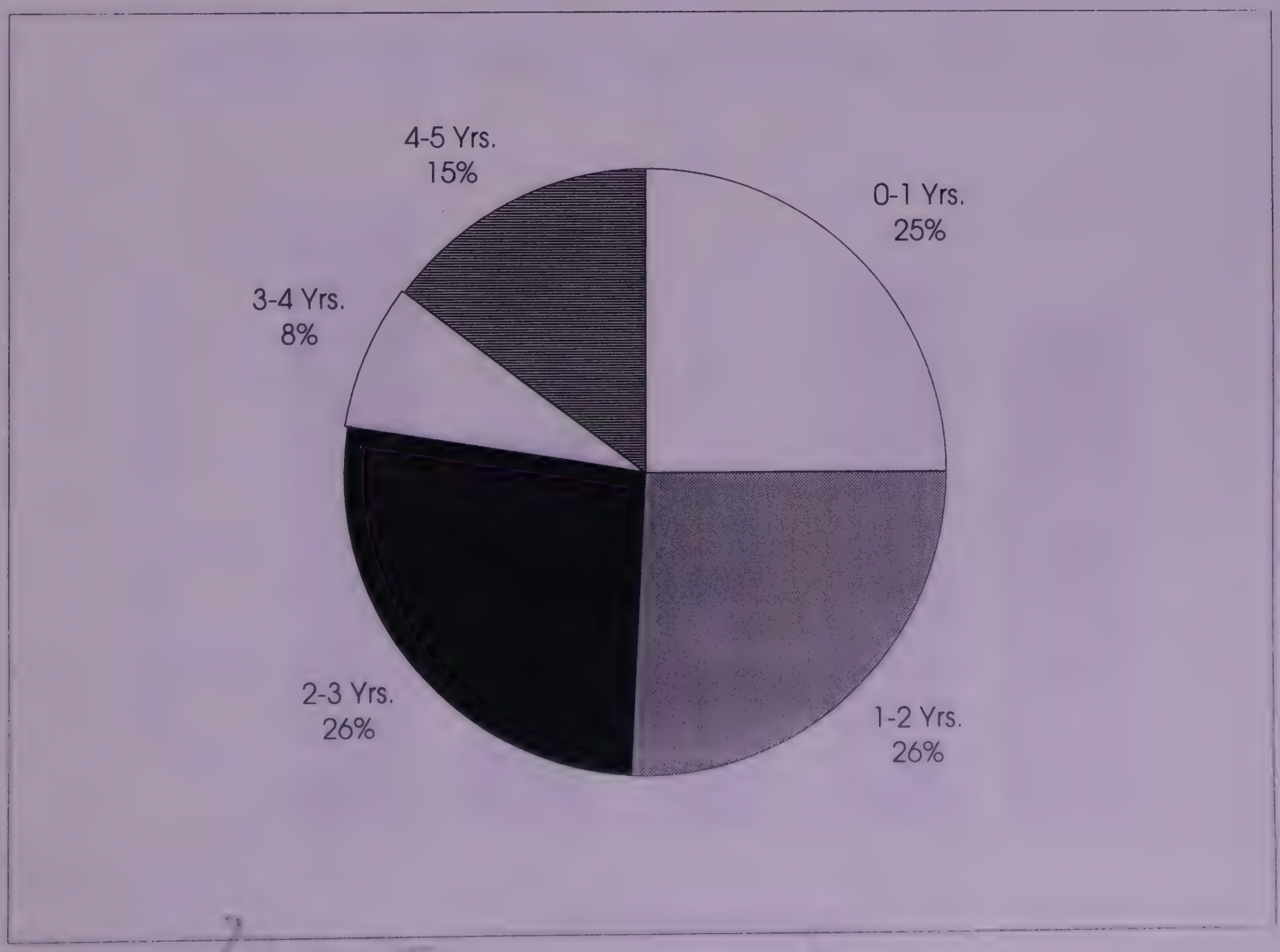
AGE AND SEX DISTRIBUTION OF ARI CASES

AGE IN YEARS	MALES		FEMALES		TOTAL NO. OF CHILDREN	TOTAL EPISODES	EPISODE/ PER YEAR.
	TOTAL NO.	EPIS-ODES	TOTAL NO.	EPIS-ODES			
0 - 1	50	93	48	75	98	168	1.7
1 - 2	47	49	54	71	101	120	1.1
2 - 3	50	53	54	59	104	112	1.0
3 - 4	13	12	17	34	30	46	1.5
4 - 5	30	29	27	51	57	80	1.4
TOTAL	190	236	200	290	390	526	1.3

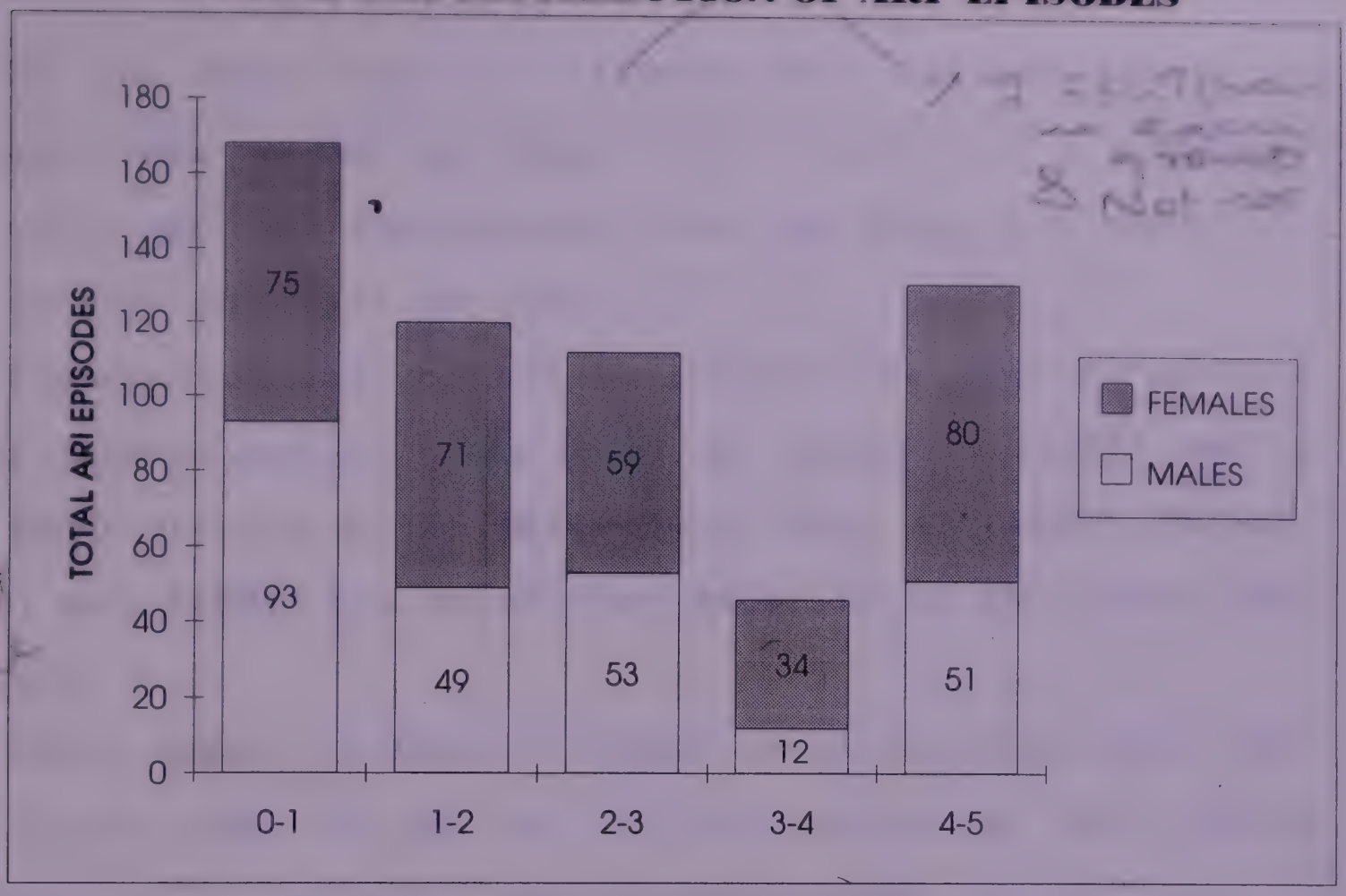
DISTRIBUTION OF THE CHILDREN ACCORDING TO SEX



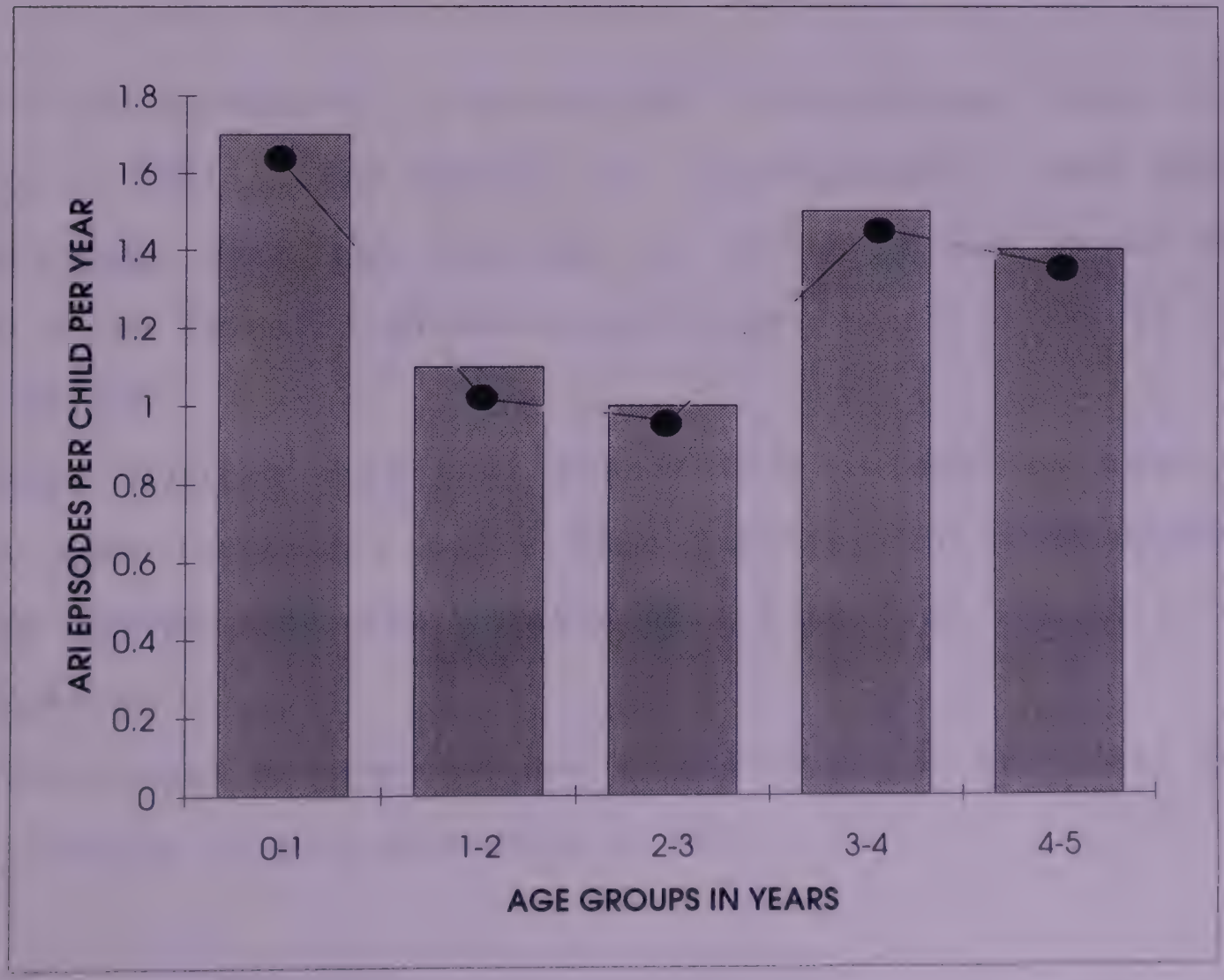
DISTRIBUTION OF THE CHILDREN ACCORDING TO AGE IN YEARS



AGE & SEX DISTRIBUTION OF ARI EPISODES



AGE DISTRIBUTION OF ARI EPISODE / CHILD / YEAR



In the above table it is seen that maximum number of episodes were in the age group of 0-1 years i.e. 1.7 episode per child per year and minimum in the age group 2-3 years i.e. 0.1 episode per child per year.

Higher incidence of ARI in infants was also noted in a study carried out in urban Delhi by ***Gulati PV (1977)*** and in the study carried out by ***Datta-Banik ND et al (1969). Patwari AK et al, (1988)*** too noted that majority of ARI cases were infants.

While ***Kumar V & Kumar L (1983)*** in their study found that the attack rate of ARI was 2.2 per child per year during infancy and it increased with increasing age.

SEX:

The ARI morbidity in males was 1.2/child/year which was similar to that in the female i.e. 1.4/child/year. This study is analogous with the findings of ***Datta DK and Walia BNS (1988)*** which revealed no difference with regard to ARI on the basis of sex.

Other studies show that respiratory infections tend to affect more frequently males than females. The ***Communicable Disease Bulletin*** reports a ratio of 1.7 to 1 of ARI in males and females.

This could be observed due to preferential treatment for males leading to more detection of ARI.

TABLE II:

DISTRIBUTION OF ARI CASES ACCORDING TO THE BIRTH ORDER OF THE CHILD

BIRTH ORDER	NO. OF CHILDREN	ARI CASES
1st (First)	168	112 (66.66%)
2nd (Second)	126	90 (71.42%)
3rd (Third)	67	56 (83.58%)
4th (Fourth)	17	15 (88.23%)
> 4th	12	10 (88.23%)
TOTAL	390	283 (72.56%)

Figure in parenthesis indicate percentages
x^2 = df = 4P < 0.05.

Higher percentage of ARI cases were seen in children of birth order 3 and above i.e. 83.58% and 88.23% in the children of birth order 3rd, 4th and > 4th respectively. Minimum percentage (66.66%) of ARI cases were seen in children of the first birth order. The result was statistically significant.

Gupta S et al (1976) showed that the frequency of morbidities was significantly high after the second child.

TABLE III :

DISTRIBUTION OF ARI CASES ACCORDING TO IMMUNISATION STATUS OF THE CHILD.

IMMUNISATION STATUS	NO. OF CHILDREN	ARI CASES
IMMUNISED	341	246 (72.14%)
INCOMPLETE	43	36 (83.72%)
NOT AT ALL	3	1 (33.33%)
UNKNOWN	3	0 (00.00%)
TOTAL	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$x^2 = 0.242$ df = 1 $p < 0.05$

341 of the 390 children were fully immunised, while 43 children had received incomplete immunisation. Only 3 children were not immunised at all.

Lower percentage of children (72.14%) who were fully immunised suffered from ARI compared to the children who were incompletely immunised where (83.72%) suffered from ARI.

TABLE IV:

RELATIONSHIP OF IMMUNISATION STATUS TO SEVERITY OF ARI

IMMUNISATION STATUS	NO. OF CHILDREN	A R I EPISODES			TOTAL ARI EPISODES	EPISODES/ CHILD/ YEAR
		MILD	MOD	SEVERE		
IMMUNISED	341	227	170	31	428	1.2
INCOMPLETELY IMMUNISED	43	27	29	40	96	2.2
NOT AT ALL	3	0	0	2	2	0.6
UN KNOWN	3	0	0	0	0	0.0

$x^2 = 82.6$ df = 2 $P < 0.001$.

The attack rate of ARI was higher in children who were incompletely immunised (2.2/child/year) as compared to children who were completely immunised (1.2/child/year). The children who were incompletely immunised suffered from more number of severe ARI episodes than children who were completely immunised.

The difference was statistically very highly significant.

TABLE V:

DISTRIBUTION OF ARI CASES ACCORDING TO BIRTH WEIGHT

BIRTH WEIGHT	NO. OF CHILDREN	ARI CASES
< 2.5	97	78 (80.41%)
2.5 - 3.5	217	135 (62.21%)
> 3.5	14	12 (85.71%)
UNKNOWN	62	58 (85.71%)
TOTAL	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$x^2 = 29.70$ df = 2 P < 0.05

Of these 390 children, 97 had birth weight less than 2.5 kg and 217 had birth weight of 2.5 - 3.5 kg.

80.41% of children weighing less than 2.5 kg suffered from ARI whereas only 62.21% of the children with normal birth weight suffered from ARI. The difference was statistically significant.

Proportion of babies below 2.00 kg and 2.0 - 2.5 kg birth weight range suffering from ARI upto the age of three years was higher as compared to those above 2.5 kg birth weight range. This was noted in a study carried out by ***Bhargava SK et al (1979).***

The study carried out by ***Bhakoo ON (1987)*** reports that lower the birth weight of babies higher are his chances to develop infection.

TABLE VI:

DISTRIBUTION OF ARI CASES ACCORDING TO MATURITY

MATURITY	NO. OF CHILDREN	ARI CASES
Preterm	57	45 (78.95%)
Term	332	237 (71.39%)
Postterm	1	1 (100.00%)
TOTAL	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$x^2 = 1.38$ df = 1 $P > 0.05$

45 of the 57 children i.e. 78.95% of the pre-term babies suffered from ARI where as only 237 of the 332 term children i.e. 71.39% of the term babies suffered from ARI. The difference was statistically not significant.

Preterm babies suffered from a higher attack rate compared to term babies. This was reported in a study carried out by *Bhalia DN et al (1977).*

TABLE VII :

DISTRIBUTION OF ARI CASES ACCORDING BREAST FEEDING PRACTICES

BREAST FEEDING	NO. OF CHILDREN	ARI CASES
Breast Fed	364	259 (71.15%)
Not Breast Fed	26	24 (92.30%)
TOTAL	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$x^2 = 5.45$ df = 1 $P < 0.05$

Majority of the children in the study were breast fed i.e. 364 out of 390 children.

The occurrence of ARI was seen to be more among children who were not breast fed than in those who were breast fed. 92.30% of the children who were not breast fed suffered from ARI while only 71.15% of the children who were breast fed suffered from ARI. The difference is statistically significant.

The study carried out by ***Kumar V et al (1981)*** revealed that infants who were breast fed had significantly lower attack rates than those who were given bottle feeds.

Also ***Woodward et al (1990)*** found that children who were breast fed suffered less respiratory illnesses than those children who were only bottle fed.

TABLE VIII:

DISTRIBUTION OF ARI CASES ACCORDING TO FAMILY SIZE.

FAMILY SIZE OF NUMBER OF CHILDREN	NO. OF CHILDREN	ARI CASES
1 - 2	225	156 (69.33%)
3 - 4	135	101 (74.81%)
> 4	30	26 (86.66%)
TOTAL	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$x^2 = 10.22$ df = 2 $P < 0.05$

It was seen that majority of the children i.e. 225 out of

390 were from family size 1-2. Out of total children belonging to families with family size > 4, 86.66% suffered from ARI while only 69.33% of the children belonging to family size 1-2 suffered from ARI. The difference was statistically significant.

The prevalence rates of respiratory infections was more in larger families than the smaller ones. This was noted in the study carried out by ***Kumar A et al (1976)***. Several studies, i.e. ***Manmohan & Kumar V et al (1982)*** and ***Bhargava SK, (1984)*** show that there is a greater likelihood of ARI in large families than those with fewer family members.

Walia B.N.S. et al, (1988) observed no significant variation in the ARI attack rate when data was analysed in respect to family size.

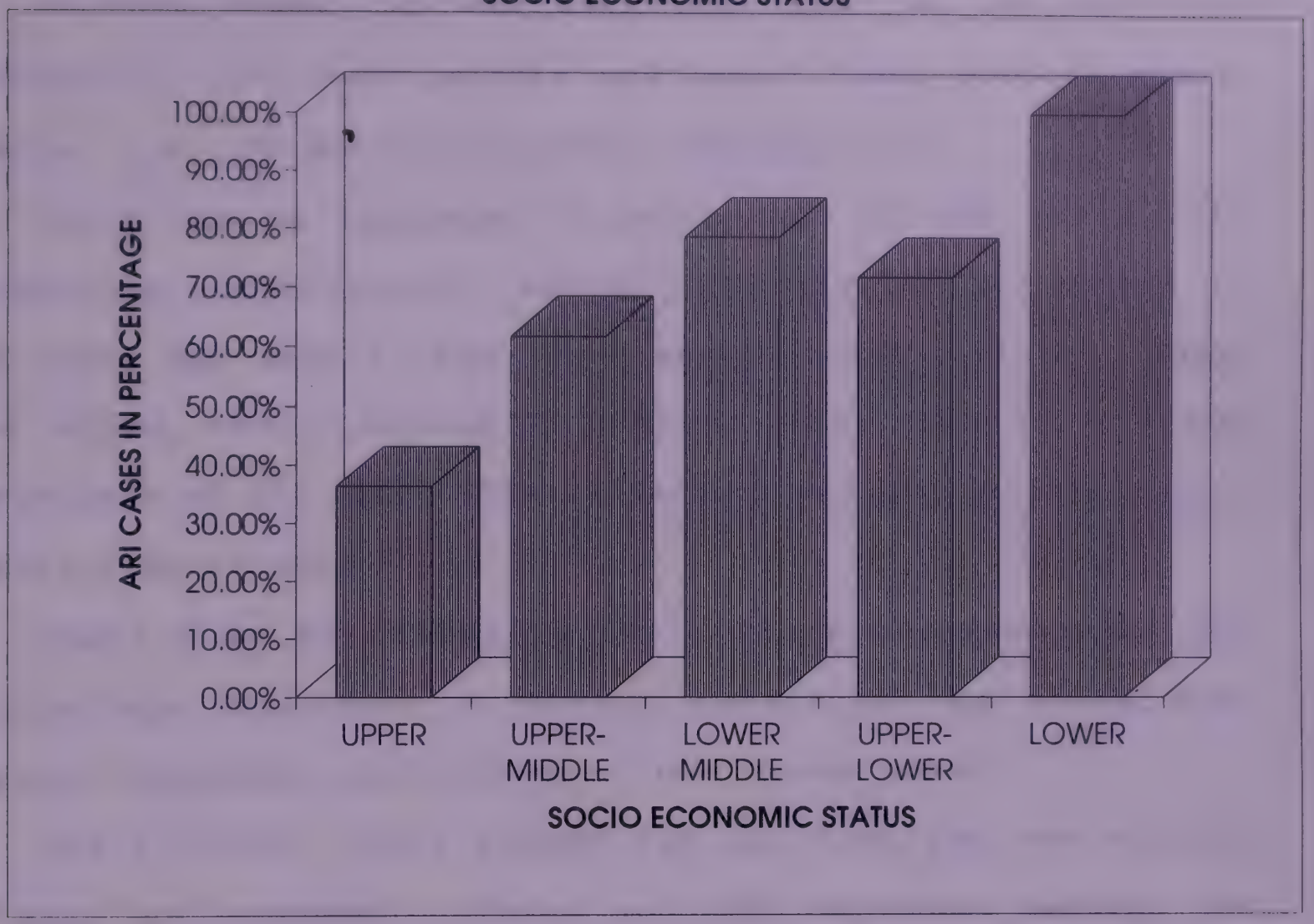
TABLE IX:

DISTRIBUTION OF ARI CASES ACCORDING TO SOCIO-ECONOMIC STATUS

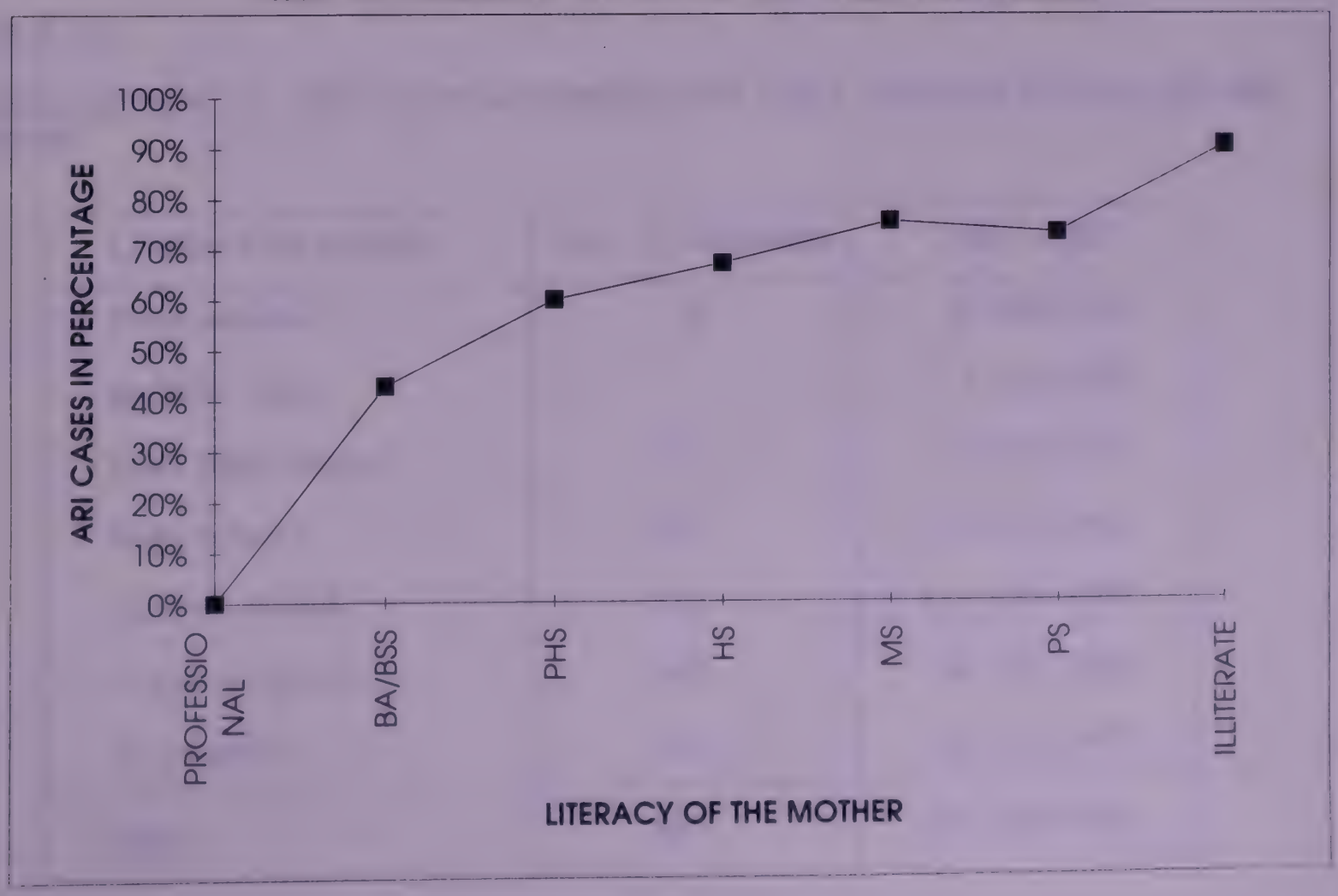
SOCIO-ECONOMIC STATUS	NO. OF CHILDREN	ARI CASES
Upper	11	4 (36.36%)
Upper - Middle	73	45 (61.64%)
Lower - Middle	198	54 (78.57%)
Upper - Lower	106	70 (71.70%)
Lower	4	4 (100.00%)
TOTAL	390	283 (72.56%)

Figures in the parenthesis indicate percentages.
$x^2 = 15.09$ df = 3 $P < 0.001$

DISTRIBUTION OF ARI CASES ACCORDING TO SOCIO ECONOMIC STATUS



DISTRIBUTION OF ARI CASES ACCORDING TO THE LITERACY STATUS OF THE MOTHER



In this study, it was seen that most of the children belonged to the lower middle and upper lower socio-economic status, i.e. 196 and 106 children respectively.

There was an increase in percentage of ARI cases with decreasing socio-economic status. The highest percentage of ARI cases was seen in the lower socio-economic status while the upper socio-economic status class showed minimum percentage of ARI cases. The difference was statistically very highly significant.

Gupta S et al (1976) in their study observed that the percentage frequency of throat infection was noted with greater frequency in children of low income group.

Walia B.N.S. et al (1988) did not find any correlation between socio-economic status and ARI incidence amongst the pre-school children studied by them.

TABLE X:

DISTRIBUTION OF ARI CASES ACCORDING TO THE LITERACY STATUS OF THE MOTHER

LITERACY OF MOTHER	NO. OF CHILDREN	ARI CASES
Professional	0	0 (00.00%)
BA/BSc. etc.	7	3 (42.85%)
Post High School	20	12 (60.00%)
High School	116	78 (67.24%)
Middle School	115	117 (75.48%)
Primary School	60	44 (73.33%)
Illiterate	32	29 (84.38%)
Total	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$x^2 = 5.71$ df = 1 $P < 0.05$

An increase in number of ARI cases was seen with decreasing literacy status of the mother. 90.62% of children whose mothers were illiterate suffered from ARI whereas only 42.85% of children whose mothers were literate suffered from ARI. The occurrence of ARI decreased with increasing literacy status of the mother. The relationship between the literacy of the mother and ARI was statistically significant.

Walia BNS et al (1988) reported in their study that parental educational status did not show any co-relation with ARI episodes per child per year.

TABLE XI :

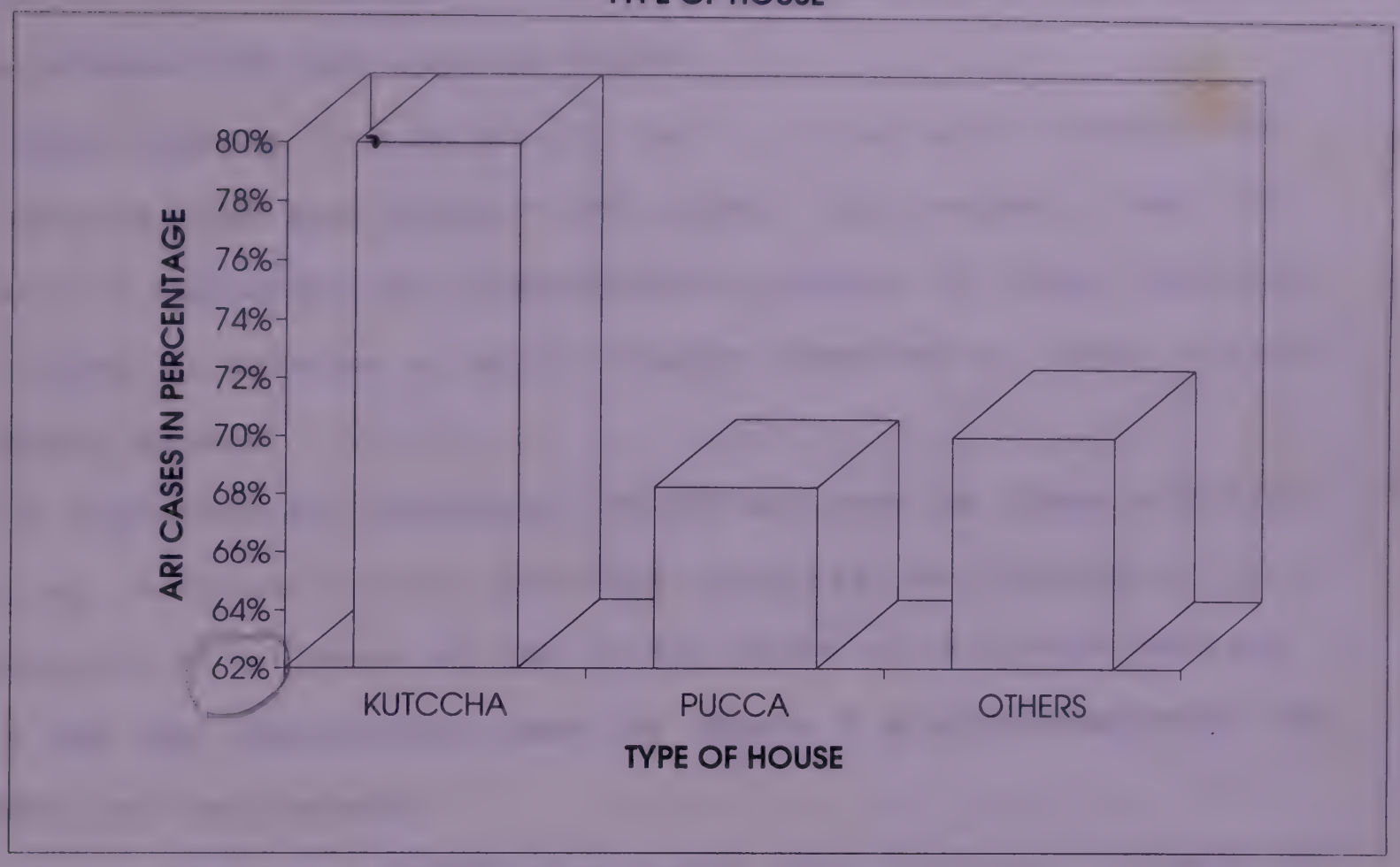
DISTRIBUTION OF ARI CASES ACCORDING TO THE TYPE OF HOUSE.

TYPE OF HOUSE	NO. OF CHILDREN	ARI CASES
Kutccha	210	160 (80.00%)
Pucca	170	116 (68.24%)
Others	10	7 (70.00%)
TOTAL	390	283 (72.56%)

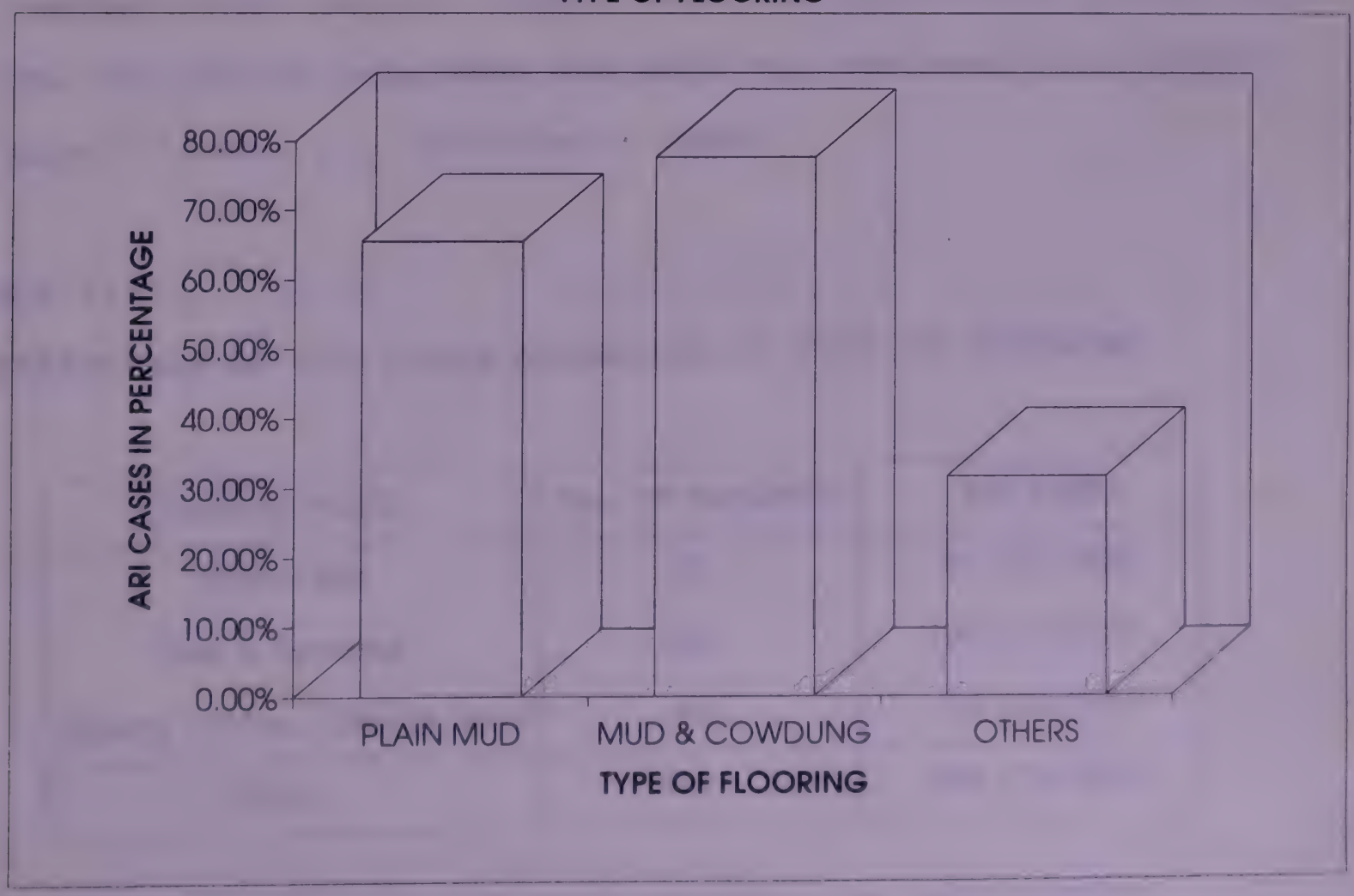
Figures in the parenthesis indicate the percentages.
$x^2 = 4.62$ df = 1 $P < 0.05$

Of the total 210 children living in kutccha houses 160 children i.e. (80.00%) suffered from ARI where as only 116 of the 170 children i.e. (68.24%) staying in pucca houses suffered from ARI. 10 children lived in mixed houses, out of

DISTRIBUTION OF ARI CASES ACCORDING TO TYPE OF HOUSE



DISTRIBUTION OF ARI CASES ACCORDING TO TYPE OF FLOORING



which 7 suffered from ARI. There was a significant association seen between ARI and type of house.

This finding is similar to that of the study carried out by ***Agrawal DK and Katyar GP (1981)*** who report that the morbidity incidence was significantly higher in those children who lived in kutccha or mixed houses compared to those living in pucca houses.

A frequency of illness of 76.5% was seen in those children living in houses with kutccha roofing as compared to a frequency of illness of 60.1% in those with pucca roofing. This was the observation made by ***Gupta S & Krishnamoorthy KA (1970)*** in their study.

Gupta S et al, (1976) also noted more frequent illness in those families living in kutccha housing.

Walia B.N.S. et al, (1988) found no significant variation in the ARI attack rate when the data was analysed with respect to type of house i.e. kutccha or pucca.

TABLE XII :

DISTRIBUTION OF ARI CASES ACCORDING TO TYPE OF FLOORING

TYPE OF FLOOR	NO. OF CHILDREN	ARI CASES
Plain Mud	87	57 (65.51%)
Mud & Cowdung	140	108 (77.71%)
Others (Tiles, Cement etc)	63	20 (31.75%)
TOTAL	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$x^2 = 55.62$ df = 2 $P < 0.001$

Majority of the children i.e. 140 out of the total 390 children lived in houses that has mud smeared with cowdung as the flooring.

It was seen that more number of children (65.51% and 77.71%) living in houses having mud and mud with cowdung as the flooring suffered from ARI respectively compared to those children living in houses having other type of flooring like tiles, cement etc where only 31.75% of the children suffered from ARI. The difference was statistically very highly significant.

This high incidence could be due to increased chances of exposure to dampness which is known to be much more in case of mud or mud with cowdung than cement.

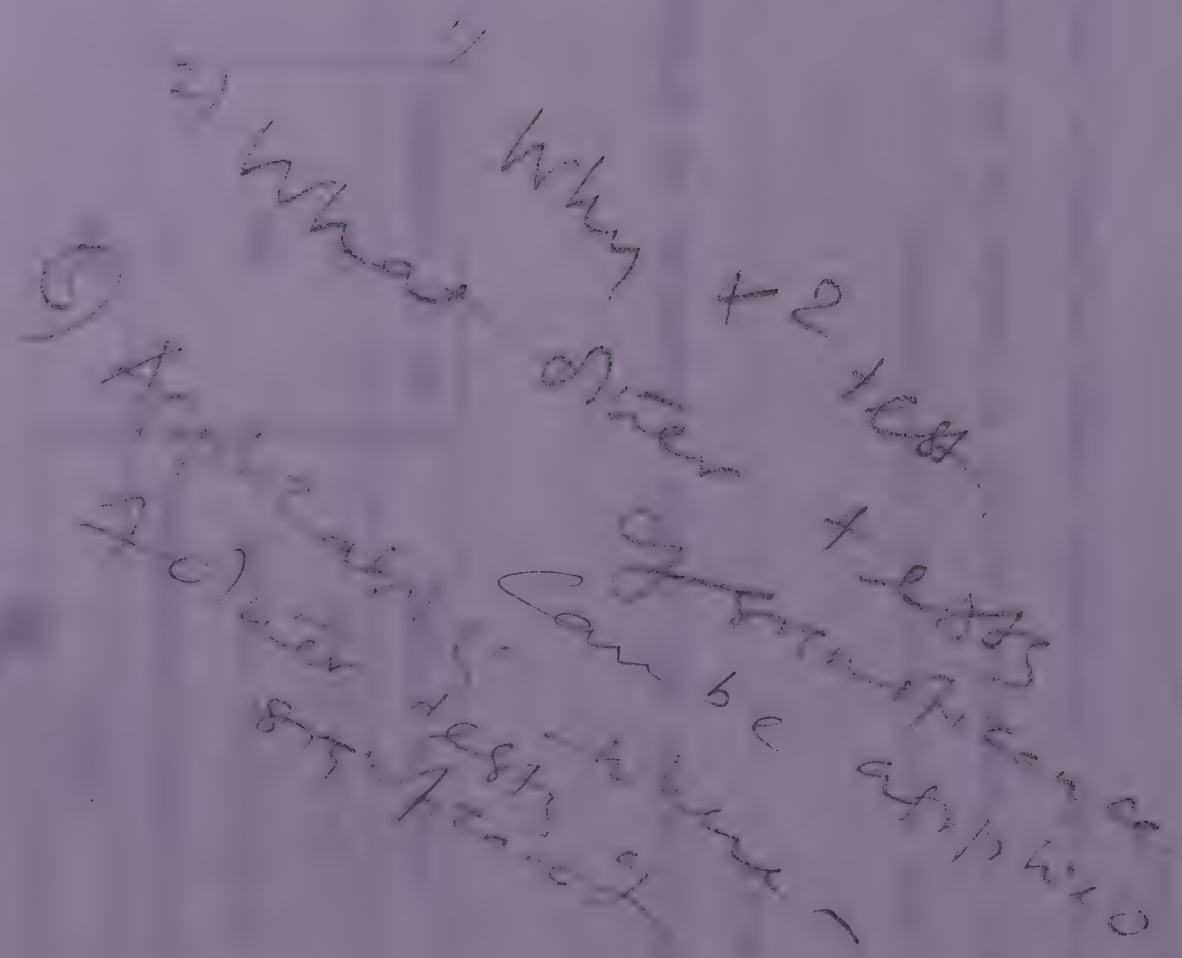
TABLE XIII :

DISTRIBUTION OF ARI CASES ACCORDING TO SLEEPING HABITS OF THE CHILD

TYPE OF HABITS	NO. OF CHILDREN	ARI CASES
On the floor	101	85 (84.16%)
On the floor and Mat	195	150 (76.92%)
On a raised surface/bed	94	48 (65.00%)
Total	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$\chi^2 = 30.51$ df = 1 $P < 0.001$

84.16% and 76.92% of children sleeping on the floor directly or the floor with mat suffered from ARI respectively.



Only 51.06% of children sleeping on a raised surface suffered from ARI. The difference was statistically very highly significant.

Keeping the child on the ground especially where the flooring is of mud, increased exposure to the dampness and thereby respiratory infections. This may be the cause of the difference seen in incidence of ARI in the various groups.

TABLE XIV :

DISTRIBUTION OF ARI CASES ACCORDING TO OVERCROWDING

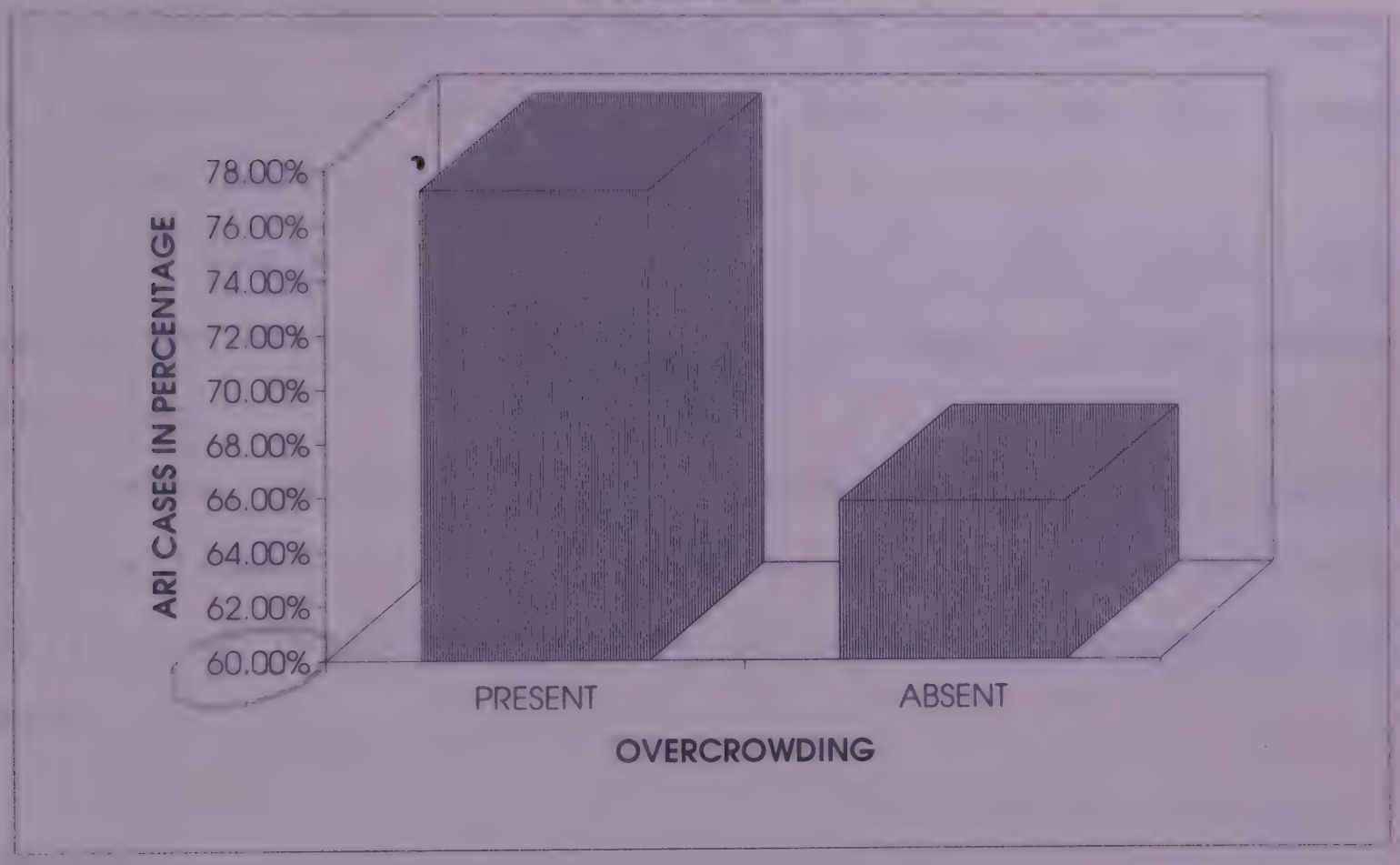
OVER CROWDING	NO. OF CHILDREN	ARI CASES
Present	229	177 (77.29%)
Absent	161	106 (65.84%)
Total	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$x^2 = 6.18$ df = 1 $P < 0.05$

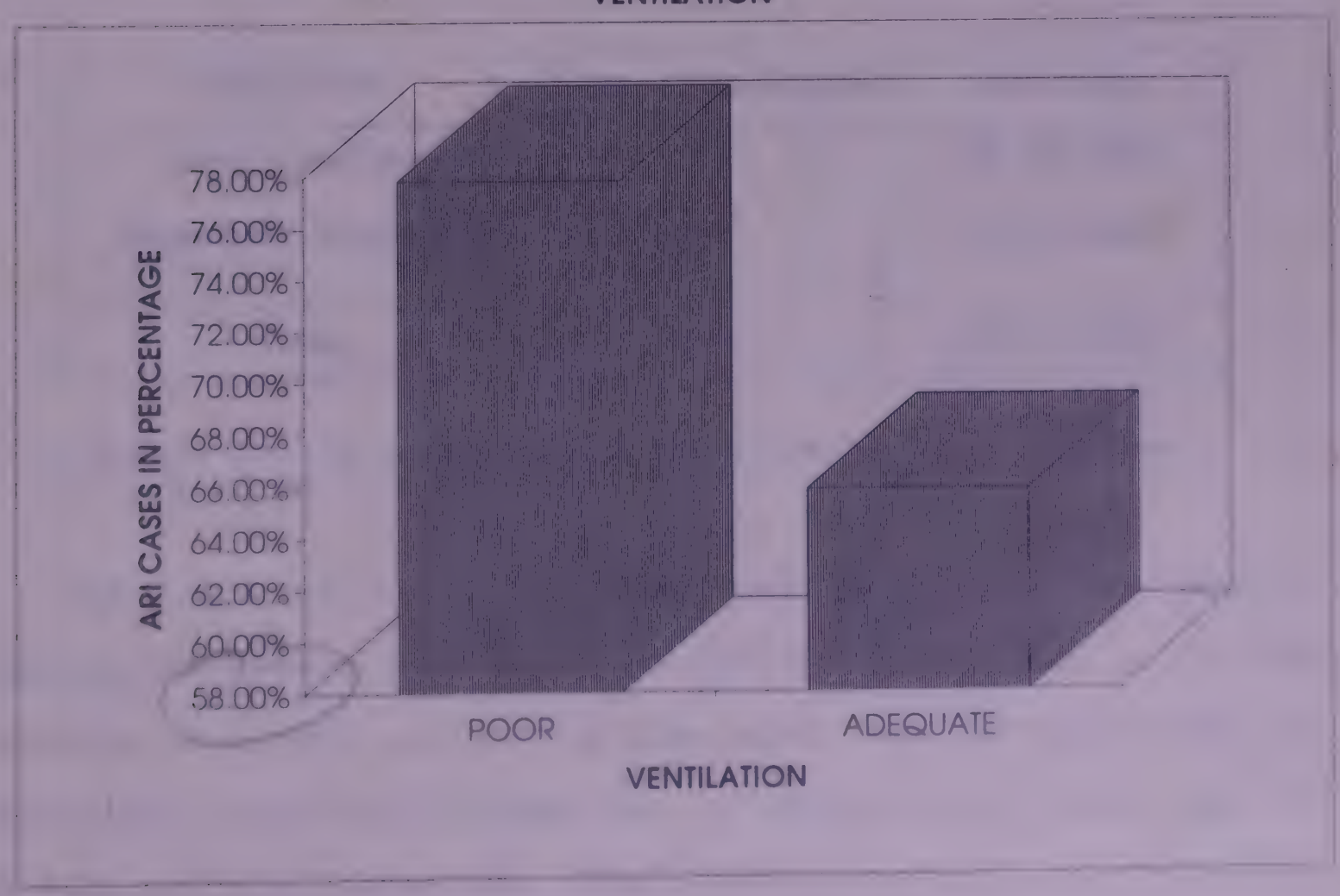
Out of the total 390 children 229 lived in houses where over-crowding was present and 161 children lived in houses where there was no overcrowding. 77.29% of the children living in houses where overcrowding is present suffered from ARI while only 65.84% of the children residing in houses where there was no overcrowding suffered from ARI. The difference was statistically significant.

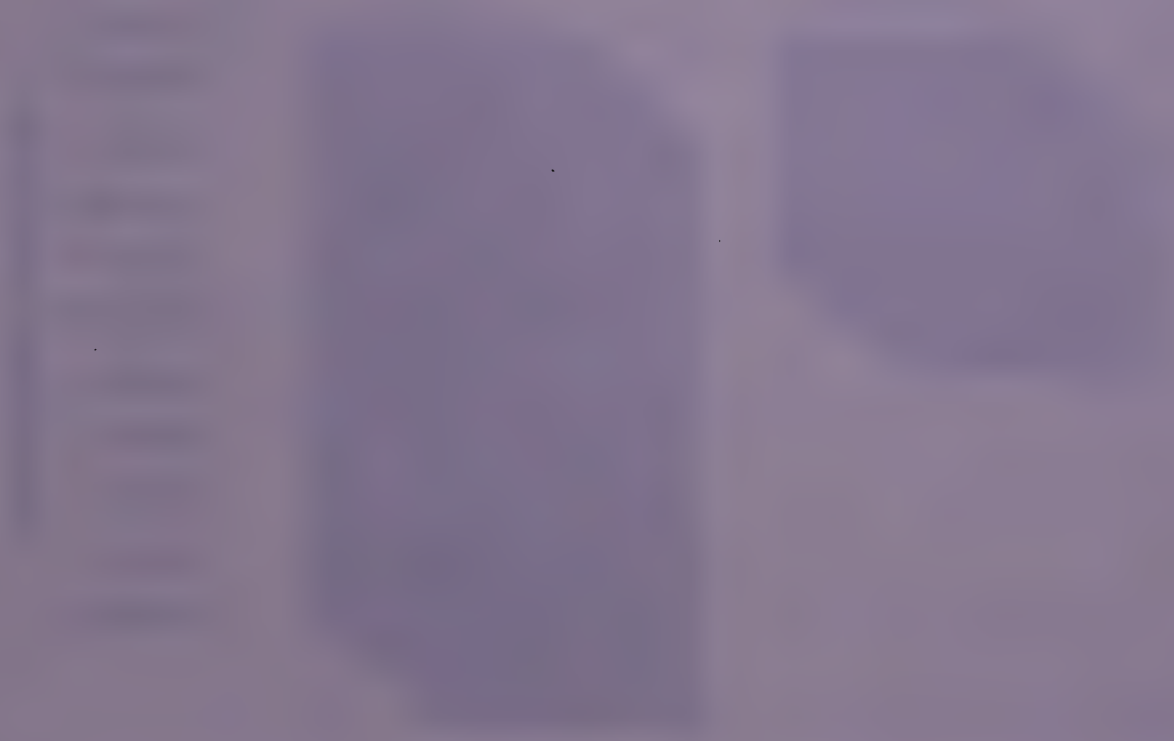
Overcrowding in the house was found to be intimately related to the high incidence of respiratory illness in a study carried out by ***Brimhle Combe F SW et al (1958). Kumar V***

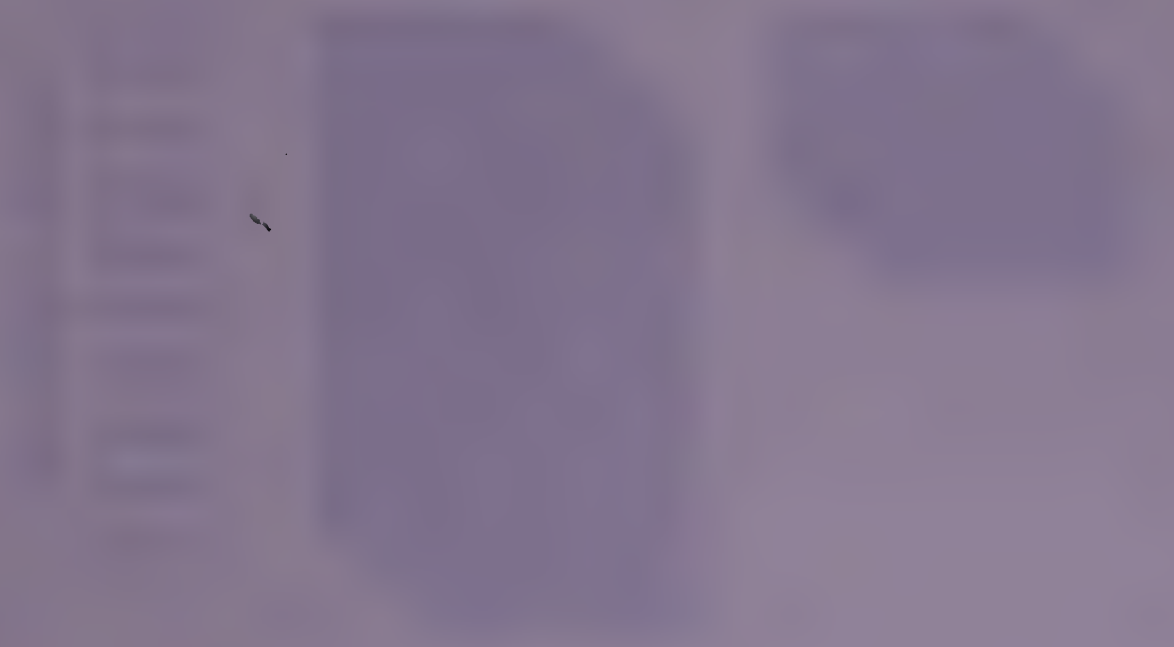
DISTRIBUTION OF ARI CASES ACCORDING TO OVERCROWDING



DISTRIBUTION OF ARI CASES ACCORDING TO VENTILATION







et al (1982) & Manmohan and Bhargava SK (1984) show that there is a greater likelihood of ARI in large families than those with fewer family members .pa

Also *Gupta S et al (1976)* showed that there was significant direct relationship between family size and common infections.

However, *Walia B.N.S. et al (1988)* in their study showed no significant variation in ARI attack rate when data was analysed in respect to number of rooms per member in the house.

TABLE XV:

DISTRIBUTION OF ARI CASES ACCORDING TO VENTILATION

VENTILATION	NO. OF CHILDREN	ARI CASES
Poorly ventilated	244	190 (77.86%)
Adequately venitlated	146	93 (63.69%)
Total	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$x^2 = 9.18$ df = 1 $P < 0.05$

244 out of the total 390 children lived in poorly ventilated houses out of which 190 children that is 77.86% suffered from ARI. 146 out of the total 390 children lived in adequately ventilated houses out of which 93 children that is 63.69% suffered from ARI. The difference was statistically significant.

Agrawal DK and Katyar GP (1981) also found that morbidity

Agrawal DK and Katyar GP (1981) also found that morbidity incidence was significantly higher in those children residing in houses having inadequate ventilation compared to those living in houses having adequate ventilation. *Walia B.N.S. et al (1988)* found no co-relation between ARI and adequacy of ventilation.

TABLE XVI:

DISTRIBUTION OF ARI CASES ACCORDING TO THE PRESENCE OF DOMESTIC ANIMALS IN THE HOUSE

DOMESTIC ANIMALS	NO. OF CHILDREN	ARI CASES
Present	127	92 (72.44%)
Absent	263	191 (72.62%)
Total	390	283 (72.56%)

Figures in the parenthesis indicate the percentages.
$x^2 = 0.0013$ df = 1 P > 0.05

Similar percentages of children living in houses where domestic animals were present and those where domestic animals were absent suffered from ARI. There was no statistical significance seen.

Walia B.N.S. et al (1988) also found no significant co-relation between ARI attack rate and presence of domestic animals.

DISTRIBUTION OF ARI CASES ACCORDING TO TYPE OF FUEL USED FOR COOKING

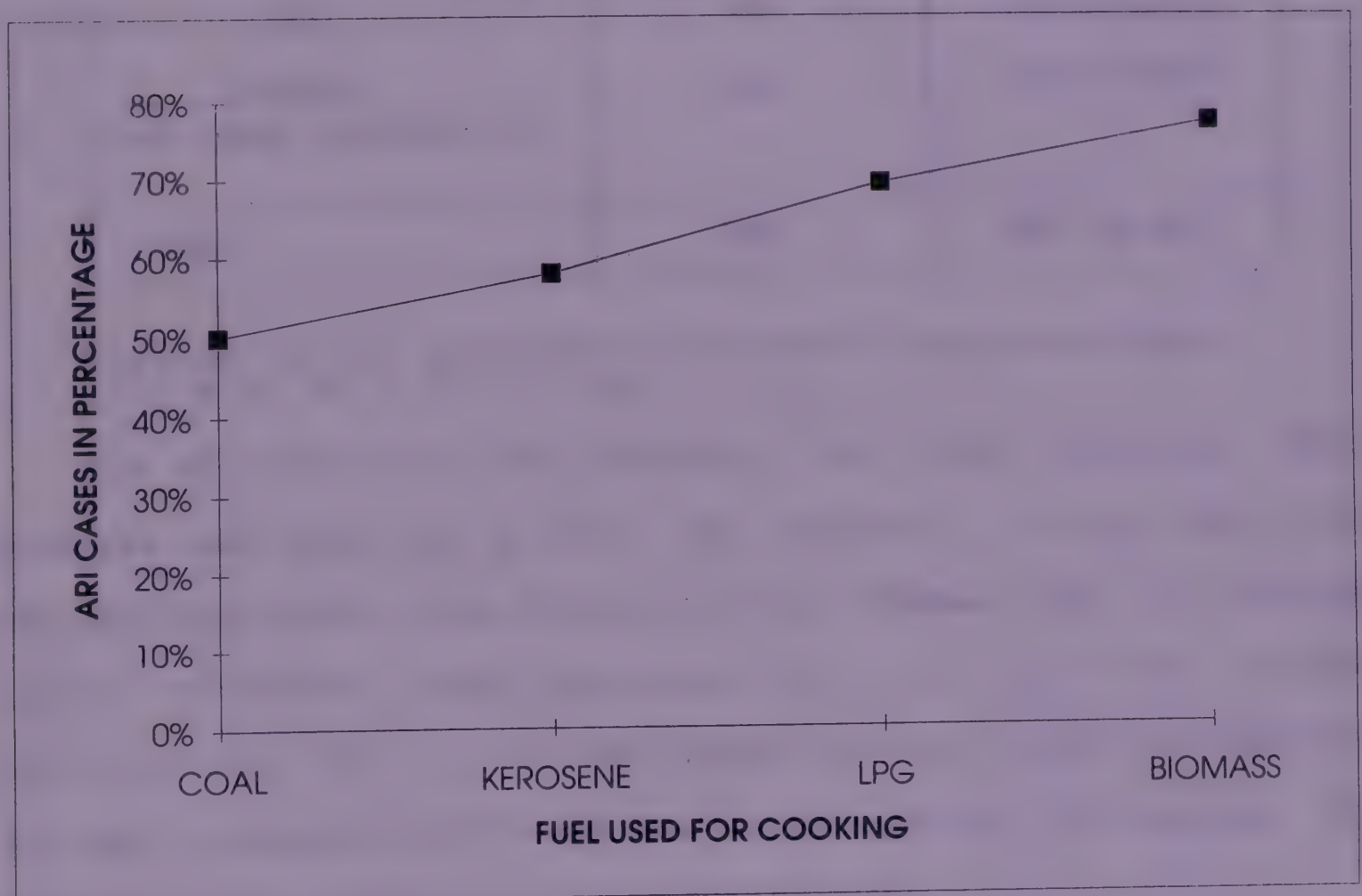


TABLE XVII:

DISTRIBUTION OF ARI CASES ACCORDING TO TYPE OF FUEL USED FOR COOKING

FUEL	NO. OF CHILDREN	ARI CASES
Coal	8	4 (50.00%)
Kerosene	38	22 (57.89%)
LPG	104	72 (69.23%)
Biomass (e.g. wood, cowdung etc.)	240	185 (77.08%)
Total	390	283 (72.56%)

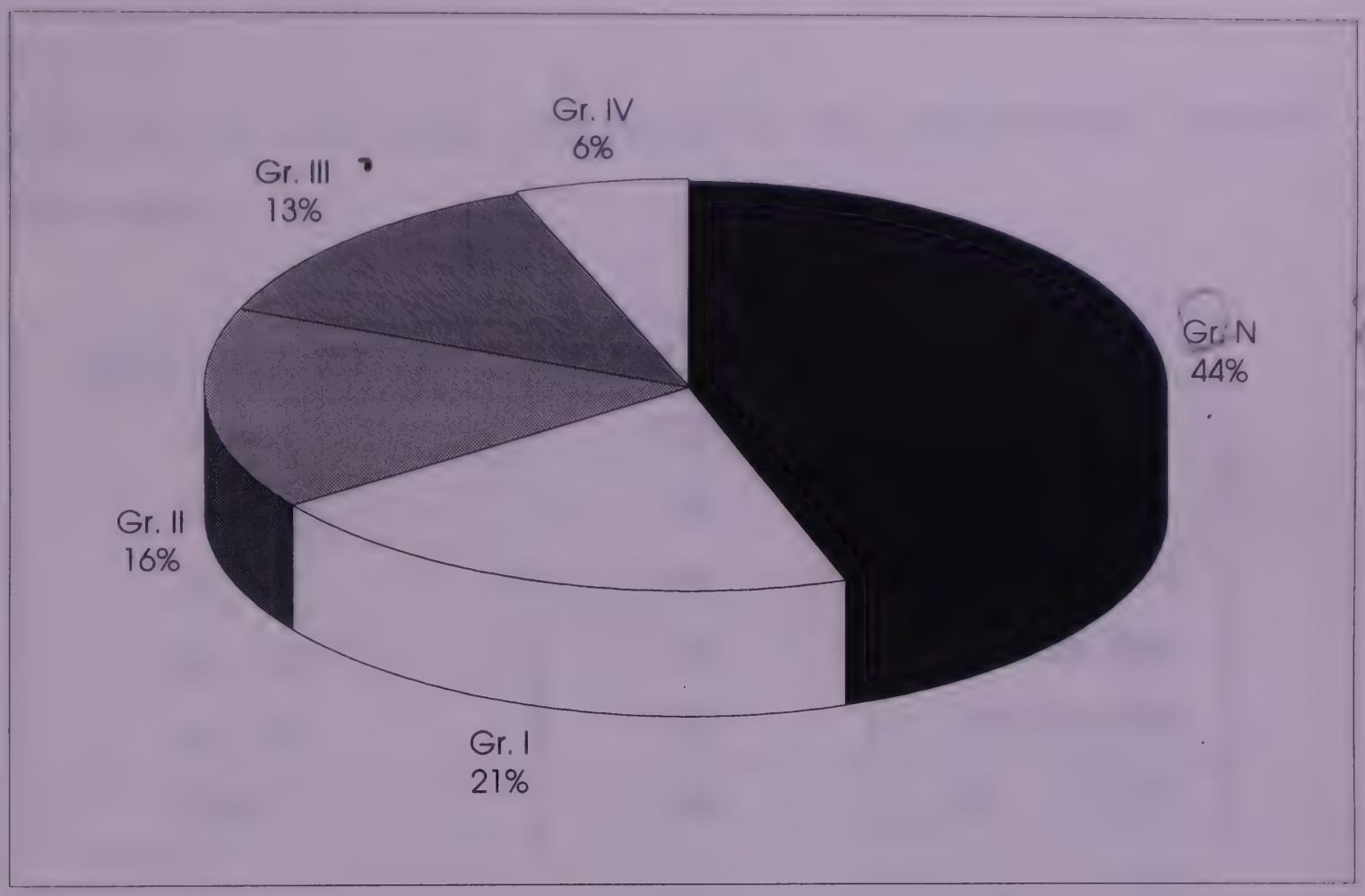
Figures in the parenthesis indicate the percentages.
$x^2 = 9.21$ df = 3 $P < 0.05$

Out of the total 390 children, 240 lived in houses where biomass was used as a fuel for cooking. It was seen that maximum children from houses using biomass that is cowdung cakes, firewood, crop residues etc., as fuel for cooking suffered from ARI i.e. 77.08% where as only 50.00% of children living in houses where coal was used as fuel for cooking. The difference was statistically significant.

Dales RE et al (1991); Neas LM et al (1991); and ***Koo LC et al (1990)*** reported in their studies that the incidence and prevalence of all respiratory symptoms were consistently higher in homes which showed an increase in house hold nitrogen released from burning of biomass.

Also various workers e.g. ***Sofoluwe GO (1968), Honicky RE et al (1983)*** have shown an increased incidence of ARI episodes among children who had been exposed to smoke from burning firewood.

NUTRITIONAL STATUS OF THE CHILDREN



DISTRIBUTION OF ARI CASES ACCORDING TO NUTRITIONAL STATUS OF THE CHILD

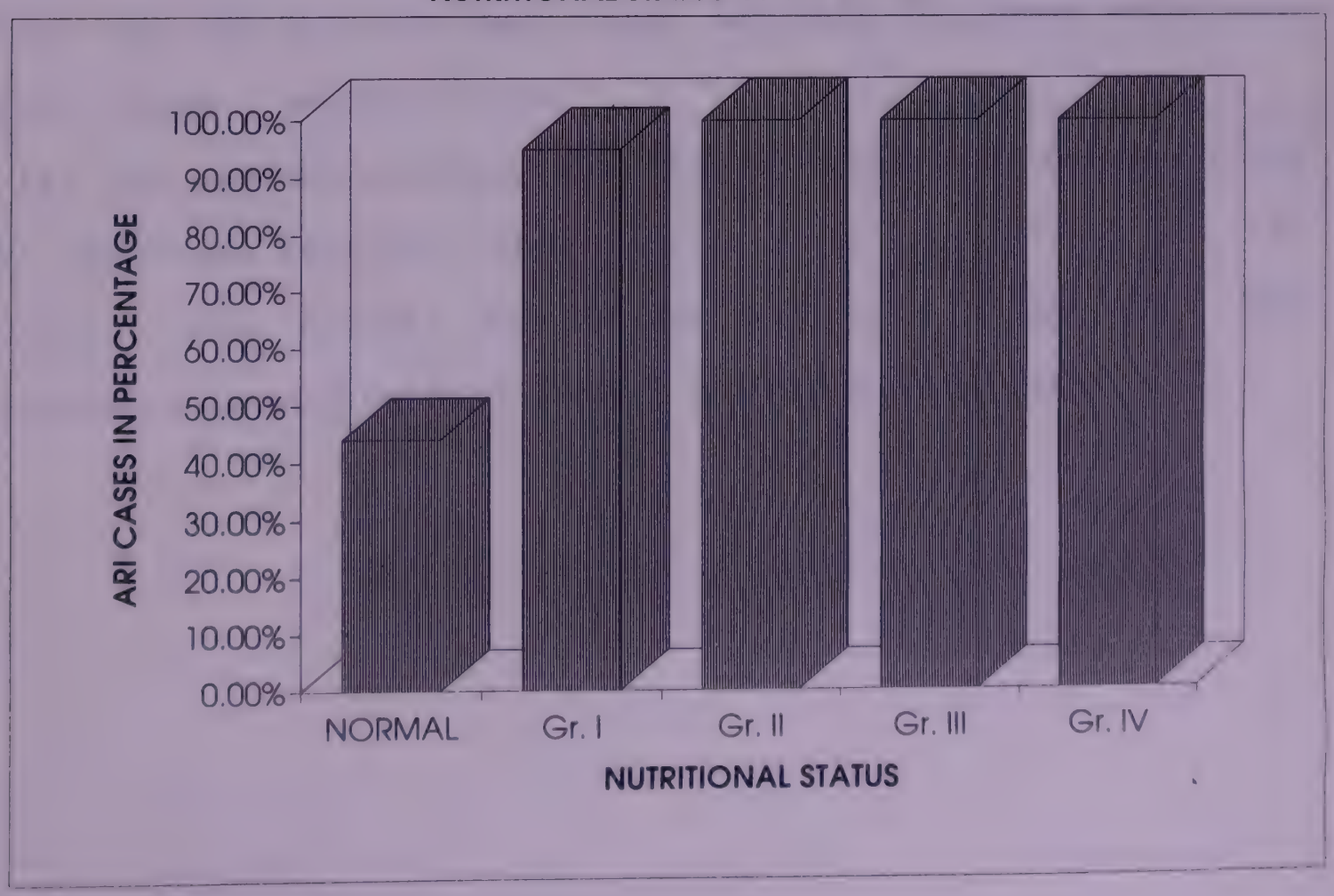


TABLE XVIII:

DISTRIBUTION OF ARI CASES ACCORDING TO THE NUTRITIONAL STATUS OF THE CHILD

NUTRITIONAL STATUS	NO. OF CHILDREN	ARI CASES
Normal	175	72 (44.14%)
Gr. I.	80	76 (95.00%)
Gr. II	62	62 (100.00%)
Gr. III	51	51 (100.00%)
Gr. IV	22	22 (100.00%)
Total	390	283 (72.56%)

Figures in the parenthesis indicate percentages
$x^2 = 155$ df = 8 $P < 0.001$

Out of total 390 children, 175 were of normal nutritional status. In the malnourished group maximum children were seen to have Grade I malnutrition.

All the children having nutritional status of Grade II and above suffered from ARI where as only 72 (44.4%) of the 175 children with normal nutrition suffered from ARI. The difference was statistically very highly significant.

Seventh Grade

10/5

or

15/6

TABLE XIX:

RELATIONSHIP OF NUTRITIONAL STATUS WITH SEVERITY OF ARI EPISODES

NUTRI-TIONAL STATUS	NO. OF CHILDREN	A R I EPISODES			TOTAL ARI EPISODES	EPISODES/ CHILD/ YEAR
		MILD	MOD	SEVERE		
N	175	126	59	3	188	1.0
GR.I	80	54	40	3	97	1.2
GR. II	62	56	37	15	108	1.6
GR.III	51	44	45	10	99	1.9
GR. IV	22	9	14	11	34	1.5
TOTAL	390	289	195	42	526	1.3

$x^2 = 25.03$ df = 2 P < 0.001

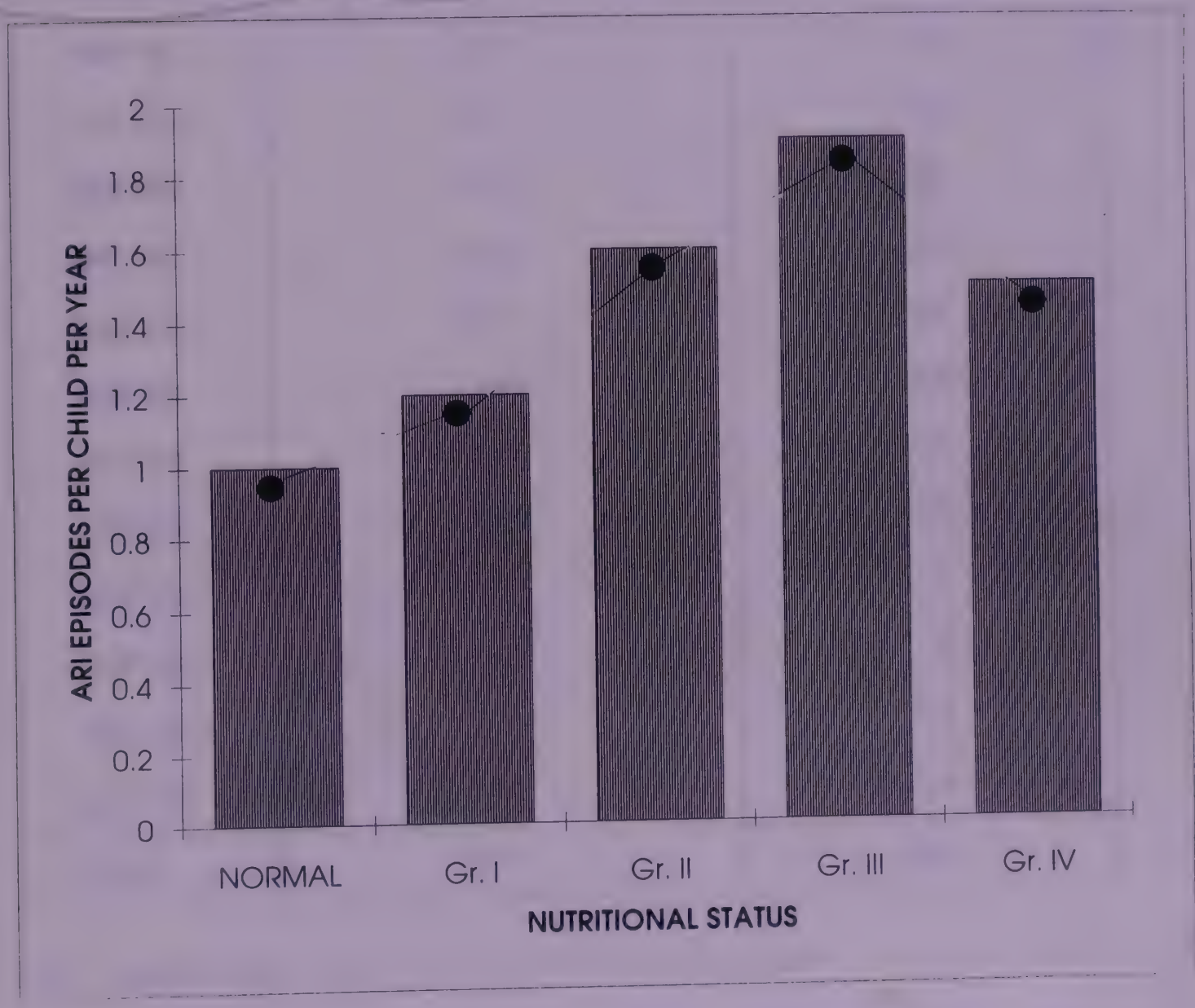
The attack rate of ARI was seen to increase with increasing grades of malnutrition. The attack rate of ARI was only 1.0/child/year in the children with normal nutrition and was much higher in children with Grade II, III and IV malnutrition, i.e. 1.6; 1.9; 1.5 respectively.

The children with Grade IV malnutrition suffered from more number of severe ARI episodes than children with lower grades of malnutrition.

Increased number of severe episodes was seen with higher grades of malnutrition.

Moderately and severely malnourished children have a 15-19 times increased risk of acquiring moderate and severe ARI as mentioned by *Tupasi TE (1985)* and *Escobar JA (1976)*. *James JW (1972)* in his study found that bronchitis occurs three times

RELATIONSHIP OF NUTRITIONAL STATUS WITH SEVERITY OF ARI EPISODES



and pneumonia 19 times more frequently compared with normal children.

TABLE XX:

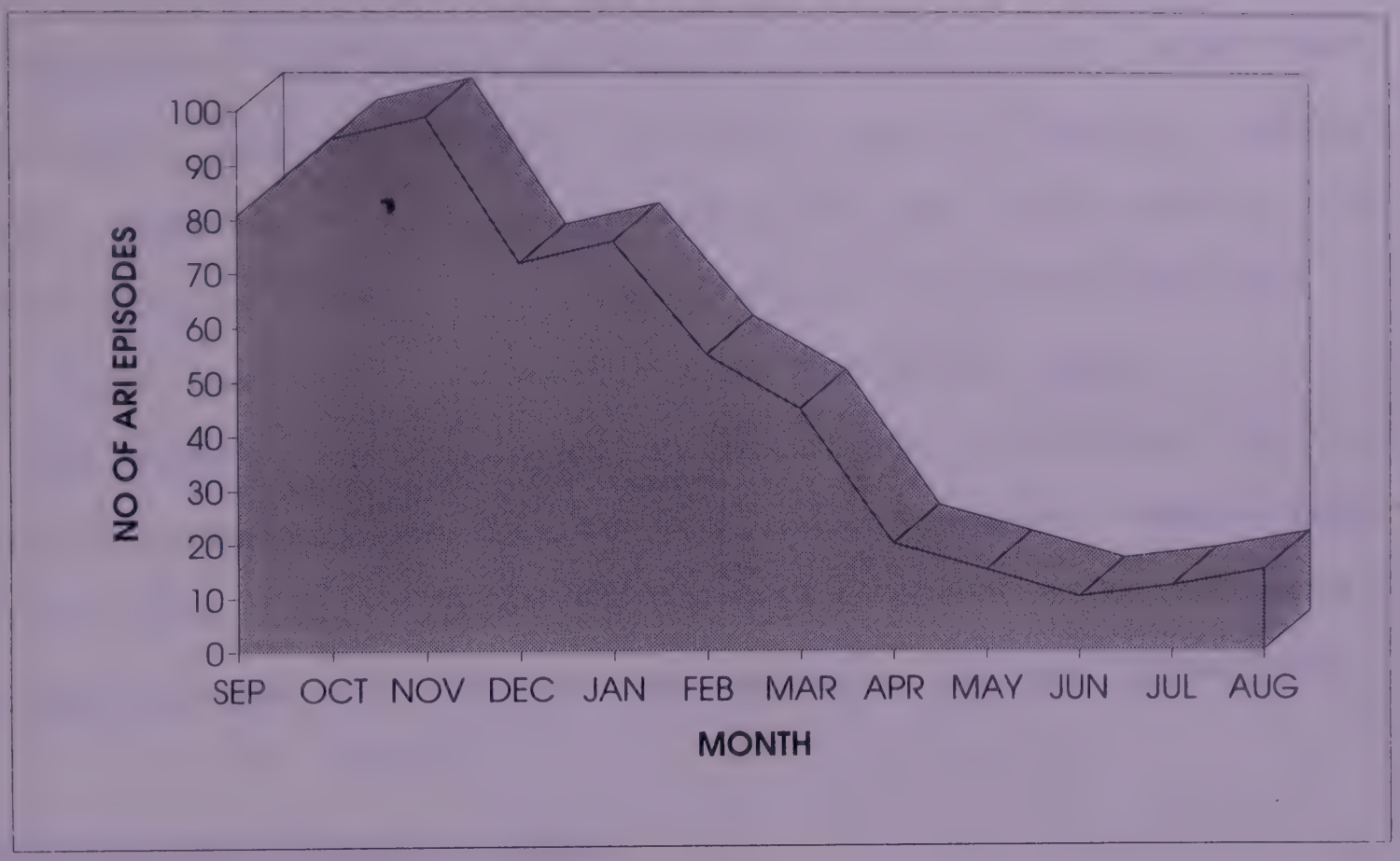
SEASONAL VARIATION OF ARI EPISODES AND ARI CASES

MONTHS	NO. OF ARI EPISODES	ARI CASES
SEP'92	81	50
OCT'92	95	59
NOV'92	99	62
DEC'92	66	21
JAN'93	59	25
FEB'93	49	24
MAR'93	35	19
APR'93	16	12
MAY'93	8	3
JUN'93	4	2
JUL'93	5	2
AUG'93	9	4
TOTAL	526	283

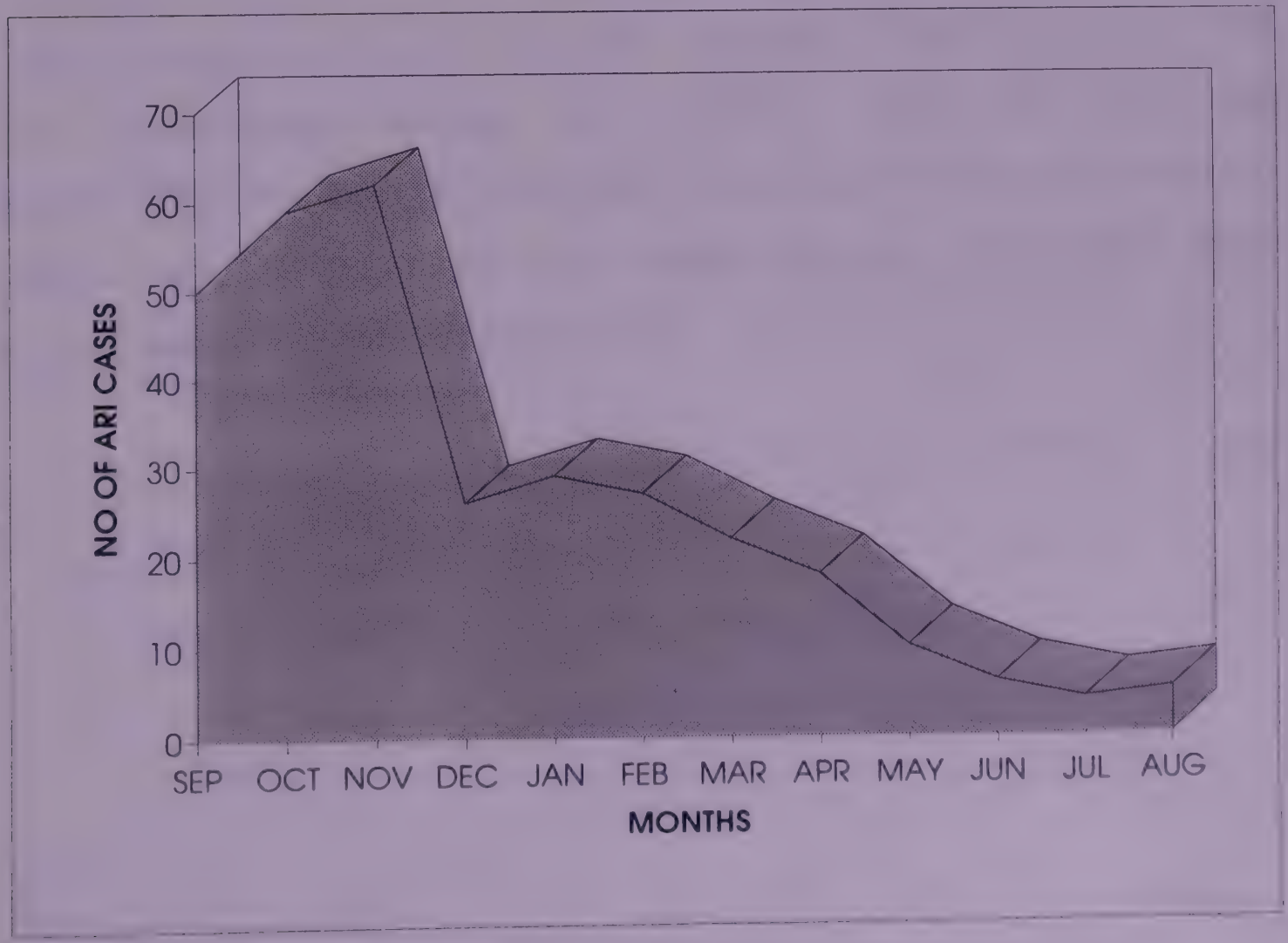
ARI episodes were noted to be maximum in the month of November and minimum in June. This study showed that ARI occurred more frequently in the winter period i.e. October to January.

Similar seasonal pattern was seen in a study carried out by *Patwari AK et al (1988)* where highest incidence of ARI was seen between September to December.

SEASONAL VARIATIONS OF ARI EPISODES



SEASONAL VARIATIONS OF ARI CASES



Reddiah VP and Kapoor SK (1990) in their study found that the attack rate was higher in winter months than in summer months. Also the finding is analogous to the study carried out in North India (1980) where respiratory infection was seen to occur more frequently in winter than any other season.

The higher incidence of respiratory infections during winter months may be due to low environmental temperature forcing the family members to stay indoors and thereby increasing opportunities for the spread of droplet infection.

Mortality/Case Fatality Rate:

During the study period no mortality due to ARI was seen and the case fatality rate in this study was found to be zero.

This could be due to various reasons like high level of health awareness among the people, availability and accessibility of health services and facilities situated in the heart of the village with good referral services, high level of immunisation coverage etc.

SUMMARY

6. SUMMARY

The present study was carried out in a rural population of Goa from August 1992 to September 1993 in order to study the epidemiological factors responsible for ARI and determine the morbidity, mortality and case fatality rate due to ARI. The ultimate aim was to recommend the preventive measure to decrease the problem of ARI in the days to come.

The summary of the results obtained is as follows.

6.1 The episode rate of ARI was 1.3 per child per year.

6.2 The highest episode rate of ARI was seen in the 0-1 years age group i.e. 1.7/child/year and minimum in the age groups 2-3 years i.e. 1.0 episode/child/year.

6.3 ARI morbidity in the males and females were similar i.e. 1.2/child/year and 1.4/child/year respectively.

6.4 Maximum number of ARI cases were seen in children of birth order greater than 4.

6.5 Lower percentage of children (72.14%) who were completely immunised suffered from ARI as compared to the children who were incompletely immunised where (83.72%) suffered from ARI.

6.5.1 The episode rate of ARI was high in children who were incompletely immunised (2.2/child/year) as compared to children who were completely immunised (1.2/child/year)

6.5.2 The children who were incompletely immunised suffered from more number of severe episodes of ARI.

6.6 60.21% of children of normal birth weight (2.5-3.5 kg) suffered from ARI while 80.41% of children with birth weight less than 2.5 kg suffered from ARI.

6.7 Among the pre-term babies 78.95% of the babies suffered from ARI and only 71.39% of the term babies suffered from ARI.

6.8 92.30% of the children who were not breast fed suffered from ARI while only 71.15% of the children who were breast fed suffered from ARI.

6.9 Only 69.33% of children belonging to families with family size 1-2 suffered from ARI where as 86.66% of children of families with family size greater than 4 suffered from ARI.

6.10 Least number of children from the upper socio-economic status suffered from ARI i.e. (36.36%), (78.57%), (71.70%) and (100.00%) children on the lower middle; upper-lower and lower socio economic status, suffered from ARI respectively.

6.11 Maximum percentage of ARI cases were seen in the children of illiterate mother that is 90.62%. With increasing literacy of mothers decreasing percentage of ARI cases were seen.

6.12 ARI occurred more in the children living in kutccha houses (80.00%) than those children living in pucca houses (68.24%).

6.13 ARI cases were least (31.75%) in children in houses where the flooring was of tile, cement etc compared to

children living in houses with flooring of mud (65.51%) and mud with cowdung (75.71%).

6.14 84.16% and 76.92% of the children who used to sleep on the floor directly or on the floor with mat had suffered from ARI respectively while only 52.06% of the children sleeping on raised surfaces had suffered from ARI.

6.15 ARI was seen in 77.29% of the children living in houses where overcrowding was present and in 65.84% of children living in houses where there was no overcrowding.

6.16 Only 63.69% of the children residing in adequately ventilated houses suffered from ARI while 77.86% of the children residing in poorly ventilated houses suffered from ARI.

6.17 The presence of domestic animals in the house did not play a role in the occurrence of ARI.

6.18 Fuel used for cooking played a significant role in the occurrence of ARI. Maximum percentage (77.08%) of children living in houses where Biomass i.e. firewood, cowdung cakes, crop residue etc. were used as fuel for cooking, had suffered from ARI. Lower percentages i.e. (50.00%), (57.89%), (69.23%) of the children residing in houses where coal, kerosene & LPG were used suffered from ARI respectively.

6.19 All the children (100.00%) having nutritional status of Grade II malnutrition and above suffered from ARI where as only 72 (44.41%) of the 175 children with normal

nutrition suffered from ARI.

6.19.1 The ARI episode rate was minimum i.e. 1.0 episode/ child/year ,in the children with normal nutrition. The ARI episode rate was seen to increase with increasing malnutrition.

6.19.2 The children of Grade IV malnutrition suffered from more number of severe ARI episodes.

6.20 This study showed that ARI occurred more frequently in the winter period i.e. October to January with a maximum incidence in November and minimum incidence in June.

CONCLUSION AND RECOMMENDATIONS

7. CONCLUSIONS AND RECOMMENDATIONS

Acute Respiratory Infections are a serious public health problem and it is a major cause of morbidity and mortality among under fives throughout the world. In the developing countries, the associated mortality in children under five years of age is 30 to 40 times higher than in developed countries.

Various factors have been linked with the incidence and severity of ARI in children.

This study showed a maximum occurrence of ARI in the age group 0-1 years which suggests that this age group is the most vulnerable. This could be due to poor immunological status of the child, therefore more attention is to be focussed on the infants.

Low birth weight babies (LBW) were seen to have higher incidence of ARI than the normal birth weight babies. Preterm babies too, have an higher incidence of ARI as compared to their term counterparts. LBW is indirectly the reflection of the health and nutritional status of the mother and the care she receives during pregnancy. Therefore an improvement in the ante-natal care would decrease the incidence of LBW and thereby ARI morbidity.

Also, in addition, proper case management in the primary health care settings would contribute to decrease in mortality due to ARI.

A distinct, increase in the incidence of ARI was seen with increasing family size. Family planning would play a significant role in counter acting this factor. The programme should lay equal stress on operative procedures of sterilization as well as on spacing methods.

Limiting the family size would also contribute to improvement in poor housing conditions and socio-economic status which were seen to significantly affect the occurrence of ARI.

Breast feeding was seen to play a positive role in the incidence of ARI therefore promotion of breast feeding is an important factor in increasing the resistance of the child to infection.

In many instances in the rural area, the flooring of the house is of mud and the practice of keeping the child on the floor, increases the chances of exposure of the child to the dampness and thereby increases the risk of respiratory infection. Therefore parents should be educated on this aspect.

The importance of adequacy of ventilation in the house should be emphasised upon as indoor pollution due to smoke from fuel like biomass was seen to increase the risk of ARI.

The community should be persuaded to have bio-gas plant through their resources, in order to decrease indoor pollution from cooking fuel.

The incidence of ARI was seen to be significantly related to the nutritional status of the children therefore health education regarding the nutritional requirements and methods

of preparing locally available nutritious food and importance of growth monitoring should be emphasised.

The same opportunity can be utilised during immunisation of the child which is also a significant factor in determining the occurrence of ARI.

Impression that until the socio-economic conditions improve, reduction in morbidity and mortality rates cannot be achieved is not strictly true as it is not realised that better utilisation of existing health facilities alone would automatically result in the improvement in the health of the community.

Intersectoral co-ordination will go a long way to achieve a decrease in the ARI morbidity and mortality. ARI control programme may be integrated with other programmes, e.g. Control of Diarrhoeal Diseases, Immunisation, Family Planning, Nutrition, MCH etc.

Overall, the points to be emphasised upon are summarised as follows:

1. Strengthening of the existing immunisation services.
2. Improving the MCH and FP services.
3. Proper case management of ARI through:
   a) Effective teaching and training programme for medical students, para medical workers etc. for management criteria for ARI control.
   b) Provision of suitable and timely referral services to higher level of care.
4. Establishment of laboratory services for the surveillance of etiological agents and their sensitivity pattern to

anti-microbials.

5. Research towards:

   a) Development of new techniques for diagnosis.
   b) Production of cheap and effective vaccines for the primary prevention of bacterial ARI e.g. Haemophilus influenzae, Streptococcal pneumoniae etc.

6. Health Education to mothers pertaining to:

   a) Importance of timely immunisation.
   b) Promotion of breast feeding.
   c) Recognition of moderate and severe ARI.
   d) Promotion of healthy and clean environment.

7. Health authorities should be encouraged to carry out epidemiological studies for:

   a) determining morbidity and mortality due to ARI.
   b) Identifying high risk groups.

8. Local bodies, governmental agencies and voluntary organisations should be involved in creating community awareness.

9. Surveillance of ARI mortality should be recorded at the level of Anganwadis and subcenters for evaluation and adequate treatment facilities should be developed at primary and community health centres.

The National ARI Control Programme has already been launched by the Government of India but there is an urgent need to accelerate, the implementation of ARI control in view of its great potential to produce an impact on infant and early childhood morbidity and mortality.

BIBLIOGRAPHY

1) Index. Bibliography & References.

2) Work of Indian Authors & Journals.

8. BIBLIOGRAPHY

1. Kumar L; "ACUTE RESPIRATORY INFECTION : CURRENT STATUS" Editorial, Indian Pediatrics; 25: 595-598, July 1988.
2. Adenbonojo F; "ARTIFICIAL VS. BREAST FEEDING; RELATION TO INFANT HEALTH IN A MIDDLE CLASS AMERICAN COMMUNITY" clin pediatr; 11: 25-29; 1972.
3. Agrawal DK; and Katyar GP; "INFLUENCE OF ENVIRONMENTAL FACTORS ON UNDER FIVE MORBIDITY" Indian Pediatrics; 18(8): 545, 1981.
4. Avila MM et al; "VIRAL ETIOLOGY IN ALRI IN CHILDREN FROM A CLOSED COMMUNITY" American Review of Respiratory Disease; 140(3): 634-637, Sep 1989.
5. Azzizi BH and Henry RL; "THE EFFECTS OF INDOOR ENVIRONMENTAL FACTORS ON RESPIRATORY ILLNESS IN PRIMARY SCHOOL CHILDREN IN KUALA LAMPUR" Int J Epidemiol; 20(1): 144-150, Mar 1991.
6. Bansali KM; Mathur GM; and Sarma R; "A STUDY OF MORBIDITY PATTERN IN PRE-SCHOOL CHILDREN" Indian J Paediatr; 46:13-24, 1979.
7. Bhattacharji S; "COMMUNITY BELIEFS AND RECOGNITION" ARI News; No 16: 3, April 1990.
8. Bhakoo ON; "PNEUMONIA IN THE NEWBORN" Indian J Pediatr; 54: 199 - 204, 1987.
9. Bhalla JN et al "A STUDY OF PRETERM BABIES" Indian Pediatr; 14: 951-958, 1977.

10. Bhargava S.K et al; "MORBIDITY PATTERN IN NEWBORNS BY GESTATION AND INTRAUTERINE GROWTH" Indian Pediatr; 11(7); 481-485, July 1974.

11. Bhargava SK et al; "A LONGITUDINAL STUDY OF MORBIDITY AND MORTALITY PATTERN FROM BIRTH TO 5 YEARS OF AGE IN INFANTS OF VARYING BIRTH WEIGHT" Indian Pediatr 16:967-973, 1979.

12. Bhargava SK and Mittal SK "THE CHALLENGE OF INFANT MORTALITY - NEED FOR A NATIONAL COMMITMENT", Indian Pediatr; 19: 287-290, 1982.

13. Bhargava V et al; "SURVIVAL, GROWTH AND DEVELOPMENT IN BABIES WEIGHING 2500 GMS OR LESS" Indian Pediatr; 7(3): 139-145, March 1970.

14. Bhattacharji S; "SPREADING THE WORD" ARI News; No.20; Pg 7, Aug 1991.

15. Bhattacharji J; "ACUTE RESPIRATORY INFECTIONS IN CHILDREN - A VIEW THROUGH DOCTORS" Swasth Hind; 262-264, Oct 1991.

16. Black RE et al "LONGITUDINAL STUDIES OF INFECTIOUS DISEASES AND PHYSICAL GROWTH OF CHILDREN IN RURAL BANGLADESH" Am J Epid; 115: 305-314, 1982.

17. Bollagu; "ACUTE RESPIRATORY INFECTIONS IN CHILDHOOD : TACKLING THE PROBLEM AT THE LEVEL OF THE NOSE" J Trop Pediatr; 35(3): 140-141, Jun 1989.

18. Brimhle Combe FSW et al; "FAMILY STUDIES OF RESPIRATORY INFECTIONS" Br Med J; 1: 119-128, 1958.

19. Bulla A; and Hitze KI; "ACUTE RESPIRATORY INFECTIONS : A REVIEW" Bulletin of the WHO; 56: 481-498; 1978.

20. Campbell H; "FINDING OUT LOCAL ATTITUDES IS VITAL" ARI News; No 23: 1, Aug 1992.

21. Campbell H et al; "CLINICAL SIGNS OF PNEUMONIA IN CHILDREN" (Letter) Lancet; 1(8643): 899-900, Apr 22 1989.

22. Campbell H et al; "INDOOR AIR POLLUTION IN DEVELOPING COUNTRIES AND ACUTE RESPIRATORY INFECTION IN CHILDREN" (letter) Lancet; 1(8645): 1012, May 6 1989.

23. CDC Definitions for nosocomial infections 1988. Am Rev Respir Dis; 139(4): 1058-1059; Apr 1989.

24. Chandra RK "PROSPECTIVE STUDIES OF THE EFFECT OF BREAST FEEDING ON THE INFLUENCE OF INFECTION AND ALLERGY" Acta Pediatr Scand; 68: 691-694, 1979.

25. Charaly D; "VIEWS AND PRACTICE : FES IN BOLIVIA" ARI News; No:23 : 4,Aug 1992.

26. Chen BH et al "INDOOR AIR POLLUTION IN DEVELOPING COUNTRIES" World Health Stat; 43(3):127-38, 1990.

27. Crofton J; and Douglas A; "THE EPIDEMIOLOGY OF RESPIRATORY DISEASE" Respiratory Diseases; Third edition: 80-91, 1981.

28. Crosse VM; "THE PRETERM BABY" Londo Churchhill Livingstone, 1972.

29. Cunnigham A; "MORBIDITY IN RELATIONSHIP BETWEEN BREAST AND BOTTLE FEEDING AND RESPIRATORY ILLNESS IN FIRST YEAR OF LIFE" Br J Prev Soc Med; 33:180-182, 1979.

30. Dales RE et al; "RESPIRATORY HEALTH EFFECTS OF HOME DAMPNESS AND MOLDS AMONG CANADIAN CHILDREN", Am J Epidemiol; 134(2); 196-203, July 15, 1991.

31. Datta N; "ACUTE RESPIRATORY INFECTION IN LOW BIRTH WEIGHT INFANTS" Indian J Pediatr; 54: 171-176, 1987.

32. Datta Banik N D et al; "A LONGITUDINAL STUDY OF MORBIDITY AND MORTALITY PATTERN OF CHILDREN UNDER THE AGE OF FIVE YEARS IN AN URBAN COMMUNITY" Indian J Med Res; 57: 948-957, 1969.

33. Datta KK; "PROBLEMS OF ARI IN INDIA, ARI MASS EDUCATION WANTED", NIPPCD Newsletter 9(S); 1-2 Jul-Aug, 1989.

34. Datta SP and Gopal DK; "A PILOT FAMILY MORBIDITY SURVEY IN PONDICHERRY TOWN (1962-1963) PART II FAMILY MORBIDITY" Ind J Med Sc; 19: 592, 1965.

35. Datter et al; "APPLICATION OF CASE MANAGEMENT TO THE CONTROL OF ARI IN LBW INFANTS, A FEASIBILITY STUDY" Bulletin of WHO; 65: 77-82, 1987.

36. De Konig HW et al "FUEL COMBUSTION AND HEALTH" Bulletin of WHO; 63:1-26, 1985.

37. Delgado H L; et al; "EPIDEMIOLOGY OF ACUTE RESPIRATORY INFECTIONS IN PRE-SCHOOL CHILDREN OF GUATEMALA" Bull Pan Am Health Org; 22(4): 383-393, 1988.

38. Delgado HL et al; "ACUTE RESPIRATORY INFECTIONS IN CHILDREN UNDER 2 YEARS OF AGE IN THE RURAL AREA OF GUATEMALA" Bol of Sanit Panam; 106(5): 429-439 (Eng Absts); May 1988.

39. Denny FW; "ACUTE RESPIRATORY INFECTIONS IN CHILDREN : ETIOLOGY AND EPIDEMIOLOGY" Paediatr Rev; 9(5): 135-146, Nov 1987 (32,ref).

40. Dijkstral et al (1990); "RESPIRATORY HEALTH EFFECTS OF THE INDOOR ENVIRONMENT IN A POPULATION OF DUTCH CHILDREN", Am Rev Respir Dis; 142(5): 1172-1178, Nov 1990.

41. Downham MAP et al; "BREAST FEEDING PROTECTS AGAINST RESPIRATORY SYNCITIAL VIRUS INFECTIONS" Br Med J; 2:274-276;1976.

42. Dugdale AE; "THE EFFECT OF THE THPE OF FEEDING IN WEIGHT GAIN & ILLNESS IN INFANTS" Br J Nutr; 26: 423-432; 1971.

43. Dutta DC; "TEXT BOOK OF OBSTETRICS", 2nd Edition, 1988.

44. Dutta M; and Sharma RS; "PROSPECTS OF NATIONAL ARI CONTROL PROGRAMME IN INDIA" Indian J Pediatr; 54: 149-152, 1987.

45. Ellestad Sayed J et al; "BREAST FEEDING PROTECTS AGAINST INJECTION IN INDIAN INFANTS", American Med Assoc J; 120 : 295-298 1976.

46. Fauveau V et al ; "IMPACT ON MORTALITY OF A COMMUNITY BASED PROGRAMME TO CONTROL ACUTE LOWER RESPIRATORY TRACT INFECTIONS" Bulletin of the WHO; 70(1): 109-116, 1992.

47. Feachem RG and Koblinsky MA "INTERVENTIONS FOR CONTROL OF DIARRHEAOL DISEASES AMONG YOUNG CHILDREN : MEASLES IMMUNISATION" Bull WHO; 61: 641-652, 1983.

Shanti Ghosh . B.I.

48. Frank AK et al; "BREAST FEEDING AND RESPIRATORY INFECTION" pediatrics; 70: 239-245, 1982.

49. Garenne M et al; "THE MAGNITUDE OF MORTALITY FROM ARI IN CHILDREN UNDER 5 YEARS IN DEVELOPING COUNTRIES" World Health Statistics quart; 45(2/3): 180-191, 1992.

50. Ghai OP;"TEXT BOOK OF PAEDIATRICS", 1990.

51. Gupta KB; "LONGITUDINAL STUDY OF MORBIDITY IN A RURAL AREA IN PUNJAB" Indian J Pediatr; 147:297-301, 1980.

52. Gulati PV; "AN EPIDEMIOLOGICAL STUDY OF MORBIDITY PATTERN" Indian Pediatr; 14: 93-97,1977.

53. Gupta S and Krishnamoorthy KA; "MORBIDITY AND MORTALITY IN CHILDREN" Indian Pediatr; 7: 563, 1970.

54. Gupta S et al; "FAMILY SIZE AS DETERMINANT OF MORBIDITY IN CHILDREN" Indian Pediatr; 13(5): 333-338, May 1976.

55. Gupta S et al; "MORBIDITY IN RELATION TO FAMILY INCOME" Indian Pediatr; 23(5): 339-343; 1976.

56. Gwatney JM et al; "SPREAD OF STREPTOCOCCUS PNEUMONIA IN FAMILIES II RELATION OF TRANSFER OF S PNEUMONIA TO INCIDENCE OF COLDS AND SEIUM ANTIBIOLOGY" J Inf Dis; 132: 82-68, 1975.

57. Harsten G et al; "ACUTE RESPIRATORY TRACT INFECTIONS IN CHILDREN: A THREE YEAR FOLLOW UP STUDY FROM BIRTH" Acta Paediatr Scand; 79(4): 402-409, Apr 1990.

58. Honicky RE et al; "SYMTOMS OF RESPIRATORY ILLNESS IN YOUNG CHILDREN AND THE USE OF WOOD BURNING STONES FOR INDOOR ENVIRONMENT" chest; 84: 90-95; 1983.

59. "INDIA LAUNCHES ARI CONTROL PROGRAMME" NIMFIT; No 7-8: Pg 2, Jan-Feb 1991.

60. James JW; "LONGITUDINAL STUDY OF MORBIDITY OF DIARRHEOA AND RESPIRATORY INFECTION IN MALNOURSHIED CHILDREN" Am J Clin Nutr; 25: 690, 1972.

61. Jason JM et al; "MORTALITY AND INFECTIONS DISEASES ASSOCIATED WITH INFANT FEEDING PRACTICES IN DEVELOPING COUNTRIES" J pediatr; 74: 702-727; 1984.

62. John JT; "MEASLES IN INDIA, A NEGLECTED PROBLEM" Indian J Pediatr; 50: 399-403, 1983.

63. Kamath KR et al; "INFECTIONS AND DIEASES IN A GROUP OF SOUTH INDIAN FAMILIES II GENERAL MORBIDITY PATTERN" AM J Epid; 89: 375-383, 1969.

64. Kapoor SK Reddiah VP; and Murthy GVS; "KNOWLEDGE, ATTITUDE AND PRACTICES REGARDING ACUTE RESPIRATORY INFECTIONS" Indian J Pediatr; 57 : 533 - 535, 1990.

65. Kaur T; "ACUTE RESPIRATORY INFECTIONS REMAIN A MAJOR KILLER OF INFANTS" NIPCCD Newsletter; 8: July-Aug, 1988.

66. Khallaf N; "VIEWS AND PRACTICE : FES IN EGYPT" ARI News; No 23: 3, Aug 1992.

67. Khan A et al; "CASE MANAGEMENT ON TRIAL" ARI News; No 20: Pg 6, Aug 1991.

68. Khan A.J et al; "ACUTE RESPIRATORY INFECTIONS IN CHILDREN : A CASE MANAGEMENT INTERVENTION IN ABBOTTABAD DISTRICT, PAKISTAN" Bulletin of the WHO; 68(5): 577-585, 1990.

69. Khan AZ et al; "IMPACT OF FAMILY SIZE ON THE MORBIDITY PATTERN IN SCHOOL CHILDREN" Indian Pediatr; 18: 107-111, 1981.

70. Khan M; Banerjee K and Diamini M; "NATIONAL ARI PROGRAMMES: MOVING FORWARD IN THE 1990s" Information contributed by the ARI Control Programmes in Pakistan; ARI News; NO 19: 4-6, April 1991.

71. Kielmann AA et al "THE NARANGWAI EXPERIMENT ON INTERACTION OF NUTRITION AND INFECTIONS-II MORBIDITY, MORTALITY AND EFFECTS" Indian J Med Res; 68:21-41,1978.

72. Koo LC et al; "PERSONAL EXPOSURE TO NITROGEN DIOXIDE AND ITS ASSOCIATION WITH RESPIRATORY ILLNESS IN HONG KONG" Am Rev Respir Dis; 141(5 Pt 1): 1119-1126, May 1990.

73. Kumar A et al; "STUDY OF MORBIDITY IN PRESCHOOL CHILDREN OF RURAL HYDERABAD IN RELATION TO FAMILY SIZE AND BIRTH INTERNAL" Indian Pediatr; 13(2); 123-126, 1976.

74. Kumar L; "ACUTE RESPIRATORY INFECTION : CURRENT STATUS" Editorial, Indian Pediatrics; 25: 595-598, July 1988.

75. Kumar L; "SEVERE ACUTE LOWER RESPIRATORY TRACT INFECTION: ETIOLOGY AND MANAGEMENT" Indian J Pediatr; 54: 189 - 198, 1987.

76. Kumar Rai N; "CAN THE ACUTE RESPIRATORY INFECTIONS PROGRAMME BE IMPLEMENTED? A QUESTION OF CREDIBILITY" World Health Forum; 9:225-227, 1988.

77. Kumar V et al; "INFANT MORTALITY IN A RURAL COMMUNITY DEVELOPMENT BLOCK IN HARYANA" Indian J Pediatr; 49: 795-802, 1982.

78. Kumar V et al; "MORBIDITY RELATED TO FEEDING PATTERN IN PRIVILEGED AND UNDER PRIVILEGED RURAL INFANTS" Indian Pediatr; 18: 743-749, 1981.

79. Kumar V; "EPIDEMIOLOGIC METHODS IN ACUTE RESPIRATORY INFECTIONS" Indian J Pediatr; 54: 205 - 211, 1987.

80. Kumar V; "COUNTRY REVIEW ON ARI" scientific working group meeting on ARI; New Delhi 1983.

81. Kumar V; "NEED FOR A NATIONAL CONTROL PROGRAMME FOR ACUTE RESPIRATORY INFECTIONS" Indian J Pediatr ; 54 : 145-148, 1987.

82. Kumar V and Kumar L; "ACUTE RESPIRATORY INFECTIONS IN INDIA - A REVIEW WITH SPECIAL REFERENCE TO CHANDIGARH EXPERIENCE" Scientific Working Group Meeting on Acute Respiratory Infections New Delhi, SEA/ARI meet 1/4, 3b 1983.

83. Leowski J; "LOCAL CARE INSTRUCTIONS NEED TO BE ADAPTED" ARI News; No 23 : 5, Aug 1992.

84. Leowski J; "MORTALITY FROM ACUTE RESPIRATORY INFECTIONS IN CHILDREN UNDER 5 YEARS OF AGE : GLOBAL ESTIMATES" Wld hlth statist. quart; 39(2): 138-144, 1986.

85. Lepage P et al; "BREAST FEEDING AND HOSPITAL MORTALITY IN CHILDREN & WANDA" Lancet ii:409-411; 1981.

86. Mahajan BK and Gupta NC; "TEXT BOOK OF PREVENTIVE AND SOCIAL MEDICINE" 1st Edition, 1991.

87. Manchanda SS; and Sachdev KK; "MORBIDITY AND MORTALITY IN CHILDREN IN NORTHERN INDIA" Indian J Pediatr; 29:333-350;1962.

88. Manmohan and Bhargava SK; "ACUTE RESPIRATORY INFECTIONS" Indian Pediatr 21:1-3, 1984.

89. Miller E; "ACCELLULAR PERTUSSIS VACCINE" ARI News; No 16: 1-2, April 1990.

90. Mishra P.K et al; "VIRAL ETIOLOGY OF ACUTE RESPIRATORY INFECTIONS IN CHILDREN IN NORTH INDIA" J Trop Pediatr; 36(1): 24-27, Feb 1990.

91. Monto A.S; "ACUTE RESPIRATORY INFECTION IN CHILDREN OF DEVELOPING COUNTRIES : CHALLANGE OF THE 1990s" Rev Infect Dis; 11(3) : 498-505 (51 ref), May-June 1989.

92. Mtango F.D et al; "MAGNITUDE, PRESENTATION, MANAGEMENT AND OUTCOME OF ACUTE RESPIRATORY INFECTIONS IN CHILDREN UNDER THE AGE OF FIVE IN HOSPITALS AND RURAL HEALTH CENTRES IN TANZANIA" Trop Med Paraitol; 40(2): 97-102, Jun 1989.

93. Murtagh K; "PERSISTENT PNEUMONIA" ARI News; No 20: 1-3, Aug 1991.

94. Narain JP and Sehgal PN; "ACUTE RESPIRATORY INFECTIONS : A PRIORITY HEALTH PROBLEM IN INDIA" J Com Dis; 19(4): 381-386, 1987.

95. Narain JP; "EPIDEMIOLOGY OF ACUTE RESPIRATORY INFECTIONS" Indian J Pediatr; 54 : 153 - 160, 1987.

96. Narain J.P; and Banerjee K.B; "ACUTE RESPIRATORY INFECTIONS WORKSHOP ON ARI" National Institute of Communicable dis, New Delhi; 3-8, 1988.

97. Narain JP and Sharma TD "ACUTE RESPIRATORY INFECTIONS IN KANGRA DISTRICT : MAGNITUDE AND CURRENT TREATMENT PRACTICES" Indian J Pediatr; 65: 441-444, 1987.

98. Neas NM et al; "ASSOCIATION OF INDOOR NITROGEN DIOXIDE WITH RESPIRATORY SYMPTOMS AND PULMONARY FUNCTIONS IN CHILDREN" Am J Epidemiol; 134(2): 204-219, Jul 15, 1991.

99. Paine R et al; "BREAST FEEDING AND INFANT HEALTH IN RURAL US COMMUNITY" Am J Dis Child; 136: 36-38, 1982.

100. Pandey MR et al; "INDOOR AIR POLLUTION IN DEVELOPING COUNTRIES & ARI IN CHILDREN" Lancet; 1012: May 6, 1989.

101. Pandey MR et al; "INDOOR AIR POLLUTION IN DEVELOPING COUNTRIES AND ARI IN CHILDREN" Lancet; 1(8635):427-429(20 ref), Feb 15,1989.

102. Pandey MR et al; "PRELIMINARY REPORT OF A COMMUNITY STUDY OF CHILDHOOD ARI IN NEPAL. EDS-DOUGLAS AND KERBY-EATON E. IN, RESPIRATORY INFECTIONS. PROCEEDINGS OF AN INTERNATIONAL WORKSHOP" Sydney, University of Adelaide, Adelaide: 131-136, 1985.

103. Patwari A.K et al; "ACUTE RESPIRATORY INFECTIONS IN CHILDREN : A HOSPITAL BASED REPORT" Indian Pediatrics; 25: 613-617, July 1988.

104. Park JE and Park K;"TEXT BOOK OF PREVENTIVE AND SOCIAL MEDICINE" 13th Edition, 1991.

105. Paul WS et al; "ACUTE RESPIRATORY ILLNESS AMONG IMMUNISED AND NONIMMUNISED PATIENTS WITH HIGH RISK FACTORS DURING A SPIT SEASON OF INFLUENZA A & B" J Infect Dis; 157(4) : 633-639, Apr 1988.

106. Philip J "RESPIRATORY EFFECTS OF POLLUTION" Bio Med Pharmacother; 44(9): 443-6, 1990.

107. Pillolto S and Douglas RM "INDOOR NITROGEN DIOXIDE AND CHILDHOOD RESPIRATORY ILLNESS" Aust J Public Health; 16(3): 245-250, Sep 1992.

108. Pinnock C; "VITAMIN A" ARI News; no 17 : 1-3, Aug 1990.

109. Pio A; "PROGRAMME PLANNING" ARI News; No 19: 1-3, April 1991.

110. Pio A; "WHO PROGRAMME ON ACUTE RESPIRATORY INFECTIONS" Indian J Pediatr; 55: 197-205, 1988.

111. Pocket-book of Health statistics in India, Central Bureau of Health and family welfare Govt. of India, New Delhi 1980.

112. Potdar RD; "ACUTE RESPIRATORY INFECTIONS IN CHILDHOOD - A MANUAL FOR DOCTORS" Indian Acadamy of Peditrics, Bombay; 1989 Pub.

113. Prat DS; "WHO IMMUNIZATION AGAINST RESPIRATORY DISEASES" ARI News, 2: Aug 1985.

114. Pringle CR; "PROGRESS TOWARDS CONTROL OF THE ACUTE RESPIRATORY VIRAL DISEASES OF CHILDHOOD" Bulletin of the WHO; 65(2): 133-137, 1987.

115. Pullan C et al; "BREAST FEEDING & RESPIRATORY SYNCYTIAL VIRUS INFECTION" Br Med J; 281: 1034-1036 1980.

116. Rao S et al; "NEO-NATAL MORBIDITY AND MORTALITY" Indian Paediatr; 7(5): 271-275, May 1970.

117. Reddaiah VP and Kapoor SK; "ACUTE RESPIRATORY INFECTIONS IN RURAL UNDERFIVES" Indian J pediatr; 55:424-426, 1988.

118. Report of Technical Advisory group; "ACUTE RESPIRATORY INFECTIONS" WHO/TRI/ARI; 1(81): 1, 1983.

119. Report on WHO Scientific Group "VIRAL RESPIRATORY DISEASES" WHO Tech Rep Ser; No: 1642, 1980.

120. Report on working group on "HEALTH FOR ALL BY 200 AD" Govt of India, Ministry of Health and Family Welfare, National Institute of Health and Family Welfare New Delhi, 1981.

121. Rochester DF and Esau SA "MALNUTRITION AND RESPIRATORY SYSTEM" Chest; 85: 411-415, 1984.

122. Rubin D et al; "RELATIONSHIP BETWEEN INFANT FEEDING AND INFECTIONS ILLNESS : A PROSPECTIVE STUDY OF INFANTS DURING FIRST YEAR OF LIFE" Pediatrics; 85(4): 464-471, April 1990.

123. Sabti J; "DIAGNOSIS AND TREATMENT OF ARI IN INDIA" ARI News; No 23: 7, Aug 1992.

124. Sanage F; "HOME REMEDIES" ARI News; No 18: 8, Aug 1990.

125. Sandhya; "HOME MADE COUGH MIXTURES" ARI News; No 20: Pg 8, Aug 1991.

126. Sehgal S; "ACUTE RESPIRATORY INFECTIONS IN INDIA" Communicable Diseases Bulletin; 5(4): 1-17, Dec 1988.

127. Seminar on Prevention of Acute Respiratory Infections in children in ICDS Projects "ACUTE RESPIRATORY INFECTIONS : MASS EDUCATION WANTED" NIPCCD Newsletter; 9(6): 1-2; July-Aug 1989.

128. Sen V; Sharma R; and Purohit BK; "MORBIDITY PATTERN AMONG CHILDREN BELOW 5 YEARS IN AN URBAN SINDHI COMMUNITY" Ind J Peditr; 45(370) : 352, 1978.

129. Seth V et al; "PROFILE OF MORBIDITY AND NUTRITIONAL STATUS AND THEIR EFFECT ON THE GROWTH POTENTIAL IN PRE-SCHOOL CHILDREN IN DELHI" J of Trop Ped & Env child health; 24(1): 23, 1979.

130. Shann F; "CLINICAL SIGNS OF PNEUMONIA IN CHILDREN" Lancet; 1(8639): 673, Mar 25, 1989.

131. Shann F; "PNEUMONIA IN CHILDREN : A NEGLECTED CAUSE OF DEATH" World Health Forum; (6) : 143-145, 1985.

132. Sharma V et al "A LONGITUDINAL STUDY OF MORBIDITY IN CHILDREN UPTO 5 YEARS OF AGE IN AN URBAN COMMUNITY" Indian J Med Res 69: 457-466, 1979.

133. Srivastava AK et al; "A LONGITUDINAL STUDY OF PHYSICAL GROWTH AND MORBIDITY PATTERN OF SMALL FOR DATE BABIES FROM BIRTH TO SIX MONTHS OF AGE" Indian J Pediatr; 45: 1-10, 1978.

134. Singhi S and Kumar L; "INADEQUACIES IN MANAGEMENT OF ACUTE RESPIRATORY INFECTIONS" Indian J Pediatr; 54: 183 - 187, 1987.

135. Singhi S and Singhi P; "PREVENTION OF ACUTE RESPIRATORY INFECTIONS" Indian J Pediatr; 54: 161 - 170, 1987.

136. Smith KR et al; "AIR POLLUTION AND RURAL BIOMASS FUELS IN DEVELOPING COUNTRIES: A PILOT VILLAGE STUDY IN INDIA AND IMPLICATION FOR RESEARCH AND STUDY" Atmospheric Environment; 17: 2343-2362, 1983.

137. Sommer A et al; "INCREASE RISK OF RESPIRATORY DISEASE AND DIARRHOEA IN CHILDREN WITH PRE-EXISTING MILD VITAMIN A DEFICIENCY" Am J Clin nutr; 40: 1090-1095, 1984.

138. Spence J et al; "A THOUSAND FAMILIES IN NEW CASTLE UPON TYME" Oxford Univ Press, London 1954.

139. Somu N et al; "MAGNITUDE OF ARI - A HOSPITAL BASED EXPERIENCE" (letter) J Trop Pedaitr; 35(3): 141-142, June 1989.

140. Steinhoff MC and John JT "APPROPRIATE STRATEGY FOR IMMUNISATION OF CHILDREN IN INDIA; VV : MEASLES AND ITS CONTROL" Priority Number One, Indian J Pediatr; 49: 303-310, 1982.

141. Survey of Infants and Child Mortality, Registrar General of India, 1979.

142. Tatochenko; "CAN THE ACUTE RESPIRATORY INFECTIONS PROGRAMME BE IMPLEMENTED? THE ARI PROGRAMME IS REALISTIC" World Health Forum; 9: 227-228, 1988.

143. Tom Kins A; "RELATIONSHIP BETWEEN ARI AND NUTRITION" ARI News; No 12, Dec 1988.

144. Tupasi TE et al; "DETERMINANT OF MORBIDITY AND MORTALITY DUE TO ACUTE RESPIRATORY INFECTIONS" J Infect Dis; 157: 615-623, 1988.

145. UNICEF; "BREAST FEEDING AND HEALTH ASSIGNMENT IN CHILDREN" 55/56: 1-120, 1981.

146. Uriutia JJ et al; "PREVALENCE OF MATERNAL & NEONATAL INFECTIONS IN DEVELOPING COUNTRY POSSIBLE LOW COST PREVENTIVE MEASURE" Ciba Foundation Symp; 77: 171-180, 1980.

147. Vandenvarg VJ; "MORBIDITY OF LOW BIRTH WEIGHT AND OR PRETERM CHILDREN COMPARED TO THAT OF MATURE I METHODOLOGICAL CONSIDERATION AND FINDINGS FOR THE FIRST 2 YEARS OF LIFE" Pediatrics; 42: 590-597, 1968.

148. Venkatesh S and Bansal RD "A LONGITUDINAL STUDY OF MORBIDITY AMONG UNDERFIVE CHILDREN IN A SEMI URBAN AREA" Indian J Comm Med; 10:11-20: 1986.

149. Verma IC and Menon PSN; "EPIDEMIOLOGY OF ACUTE RESPIRATORY DISEASE IN IN NORTH INDIA" Ind J Ped; 48: 37, Jan-Feb 1981.

150. Verma IC; "NEW BACTERIAL VACCINES FOR ACUTE RESPIRATORY INFECTION" Indian J Pediatr; 54: 231 - 218, 1987.

151. Wafula EM; "CHRONIC COUGH" ARI News; No 20 : Pg 4, Aug 1991.

152. Wafula M et al; "INDOOR AIR POLLUTION IN A KENYAN VILLAGE" East Afr Med J; 67(1) : 24-32 jan 1990.

153. Walia BNS et al; "SOCIO-ECONOMIC AND ECOLOGIC CORRELATES OF ACUTE RESPIRATORY INFECTIONS IN PRE-SCHOOL CHILDREN" Indian Pediatrics; 25: 607-611, July 1988.

154. Watkin CJ et al; "THE RELATIONSHIP BETWEEN BREAT FEEDING AND BOTTLE FEEDING AND RESPIRATORY ILLNESSES IN THE FIRST YEAR OF LIFE" Br J Soc Med; 33: 118-128, 1979.

155. WHO; "CONTACT OF ARI IN THE AMERICA" Bulletin of the Pan American Health Organisation; 26(3): 274-278, 1992.

156. WHO; "CAN COMMUNITY HEALTH WORKERS DEAL WITH PNEUMONIA ?" World Health Forum; 9: 221-224, 1988.

157. WHO memorandum; "CLINICAL MANAGEMENT OF ACUTE RESPIRATORY INFECTIONS IN CHILDREN" Bulletin of the WHO; 59: 707-716, 1981.

158. WHO; Technical Report series No 642: 16, 1980.

159. WHO; "ACUTE RESPIRAORY INFECTIONS IN SOUTH-EAST INDIA" Report of an inter-country meeting; SEARO, Tech. Publication WHO, New Delhi; (8) 1988.

160. WHO; "ACUTE RESPIRATORY INFECTIONS IN CHILDREN OF SOUTH-EAST ASIA: A CHALLENGE" Acute Respiratory Infections: A major child killer, WHO information Kit;(2): Nov 1991.

161. WHO; "AWARENESS ABOUT ACUTE RESPIRATORY INFECTIONS IN CHILDREN : WHAT PEOPLE MUST KNOW" Acute Respiratory Infections: A major child killer, WHO Information Kit; (3); Nov 1991.

162. WHO; "INTEGRATED STRATEGIES TO PREVENT AND CONTROL ACUTE RESPIRATORY INFECTIONS" Acute Respiratory Infections : A major child killer, WHO information Kit; (4): Nov 1991.

163. WHO; "MESSAGE FROM DR U KO KO" Acute Respiratory Infections: A major child killer, WHO Information Kit; (1) Nov, 1991.

164. WHO; "PROGRAMME OF ACUTE RESPIRATORY INFECTIONS PROGRESS AND CURRENT STATUS OF THE ARI PROGRAMME AT GLOBAL LEVEL" WHO document WHO/RSD/85: 17, 1983-84.

165. WHO/UNICEF statement; "BASIC PRINCIPLES FOR CONTROL OF ACUTE RESPIRATORY INFECTIONS IN CHILDREN IN DEVELOPING COUNTRIES" WHO Geneva; 1986.

166. Wilson RP et al; "FOCUSS ETHNOGRAPHIC STUDY : AN ARI RESEARCH TOOL" ARI News No 23: 2, Aug 1992.

167. Winikoff B; "ISSUES IN THE DESIGN OF BREAST FEEDING RESEARCH" studies in family planning; 12: 177-184, 1981.

168. Winikoff B; "ISSUES IN THE DESIGN OF BREAST FEEDING REASERCH" Studies in Family Planning; 12: 177-184, 1981.

169. Woodward A et al; "ACUTE RESPIRATORY ILLNESS IN ADELAIDE CHILDREN: BREAST FEEDING MODIFIES THE EFFECT OF PASSURE SMOKING" Journal of Epidemiology and Community Health; 44: 224 - 230, 1990.

170. Workshop on National ARI control Programme New Delhi "ARI REVIEW MEETING" NIMFIT No 13, July 1991.

171. Wright A L et al; "RELATIONSHIP OF PARENTAL SMOKING TO WHEEZING AND NON-WHEEZING LOWER RESPIRATORY TRACT ILLNESSES IN INFANCY" The Journal of Pediatrics; 118(2): 207 - 214, Feb 1991.

ANNEXURE

ANNEXURE

A LONGITUDINAL STUDY OF ACUTE RESPIRATORY INFECTIONS IN UNDER FIVE AGE GROUP IN A RURAL AREA OF GOA.

PROFORMA **Serial No. _____**

I. SCHEDULE I :

1. Name of the child
2. Fathers Name
3. Mothers Name
4. Address
5. Age
   - a) Months ..... ( )
   - b) Years ..... ( )
6. Sex
   - a) Male ..... ( )
   - b) Female ..... ( )

II. SCHEDULE II :

1. Birth order of the child
   - a) First ..... ( )
   - b) Second ..... ( )
   - c) Third ..... ( )
   - d) Fourth ..... ( )
   - e) > fourth ..... ( )
2. Immunisation status
   - a) Completely immunised ..... ( )
   - b) Incompletely immunised..... ( )
   - c) Not immunised at all ..... ( )

3. Birth weight

a) Low birth weight < 2.5 Kg ..... ( )

b) Average 2.5 to 3.5 Kg ..... ( )

c) High birth weight > 3.5 Kg..... ( )

4. Whether child was

a) Preterm ..... ( )

b) Term ..... ( )

c) Postterm ..... ( )

5. Whether child was breast fed

a) Yes ..... ( )

b) No ..... ( )

6. Whether feeding was continued during illness

a) Yes ..... ( )

b) No ..... ( )

7. Family size : (No. of children)

a) 1-2 ..... ( )

b) 3-4 ..... ( )

c) > 4 ..... ( )

8. Socio-economic status : (Kuppuswamy classification)

8.1 A) EDUCATION :

1. Professional.....7.... ( )

2. BA/BSc Degree .....6.... ( )

3. Post high-school.....5.... ( )

4. High school certificate....4.... ( )

5. Middle school certificate..3.... ( )

6. Primary school.....2.... ( )

7. Illiterate .....1.... ( )

A. _____

ANNEXURE

A LONGITUDINAL STUDY OF ACUTE RESPIRATORY INFECTIONS IN UNDER FIVE AGE GROUP IN A RURAL AREA OF GOA.

PROFORMA **Serial No. _____**

I. SCHEDULE I :

1. Name of the child
2. Fathers Name
3. Mothers Name
4. Address
5. Age
   - a) Months ..... ( )
   - b) Years ..... ( )
6. Sex
   - a) Male ..... ( )
   - b) Female ..... ( )

II. SCHEDULE II :

1. Birth order of the child
   - a) First ..... ( )
   - b) Second ..... ( )
   - c) Third ..... ( )
   - d) Fourth ..... ( )
   - e) > fourth ..... ( )
2. Immunisation status
   - a) Completely immunised ..... ( )
   - b) Incompletely immunised..... ( )
   - c) Not immunised at all ..... ( )

3. Birth weight

a) Low birth weight < 2.5 Kg ..... ( )

b) Average 2.5 to 3.5 Kg ..... ( )

c) High birth weight > 3.5 Kg..... ( )

4. Whether child was

a) Preterm ..... ( )

b) Term ..... ( )

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5. Whether child was breast fed

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a) Yes ..... ( )

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7. Family size : (No. of children)

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8. Socio-economic status : (Kuppuswamy classification)

8.1 A) EDUCATION :

1. Professional.....7.... ( )

2. BA/BSc Degree .....6.... ( )

3. Post high-school.....5.... ( )

4. High school certificate....4.... ( )

5. Middle school certificate..3.... ( )

6. Primary school.....2.... ( )

7. Illiterate .....1.... ( )

A. _____

8.2 B) OCCUPATION :

1. Profession .....10.... ( )
2. Semi profession.....6.... ( )
3. Clerical/shop owner.....5.... ( )
4. Skilled worker.....4.... ( )
5. Semi skilled worker.....3.... ( )
6. Unskilled worker.....2.... ( )
7. Unemployed.....1.... ( )

B. _____

8.3 C) INCOME :

1. Above 2000/- per month ...12.... ( )
2. 1000-1999/- per month.....10.... ( )
3. 750-999/- per month.....6.... ( )
4. 500-749/- per month.....4.... ( )
5. 300-499/- per month.....3.... ( )
6. 101-299/- per month.....2.... ( )
7. 100/- per month.....1.... ( )

C. _____

Total score = A+B+C = _____

1) Upper 26-29 ..... ( )
2) Upper middle 16-25..... ( )
3) Lower middle 11-15..... ( )
4) Upper lower 5-10..... ( )
5) Lower <5 ..... ( )

9. Literacy of mother

a) Professional..... ( )

b) BA/BSc..... ( )

c) Post graduation..... ( )

d) High school..... ( )

e) Middle school..... ( )

f) Primary school..... ( )

g) Illiterate..... ( )

9. Type of house

a) Kuttcha..... ( )

b) Pucca..... ( )

c) Others..... ( )

10. Type of floor

a) Plain mud..... ( )

b) Mud smeared with cowdung ..... ( )

c) Tiles..... ( )

d) Others eg. cement..... ( )

11. Sleeping habits

a) On the floor ..... ( )

b) On the floor with mat..... ( )

c) On a raised surface..... ( )

12. Overcrowding

a) Present..... ( )

b) Absent..... ( )

13. Ventilation

a) Adequate ..... ( )

b) Inadequate..... ( )

14. Whether domestic animals present in the house

a) Yes ..... ( )

b) No ..... ( )

15. Fuel used for cooking

a) Coal ..... ( )

b) Kerosene ..... ( )

c) LPG ..... ( )

d) Biomass

i.e. firewood, cowdung cakes etc.. ( )

III. SCHEDULE III :

A) SYMPTOMATOLOGY :

Whether child has any of the following at present:

a) Cough..... ( )

b) Fever..... ( )

c) Blocked/Running nose..... ( )

d) Ear pain ..... ( )

e) Hoarsenes of voice ..... ( )

f) Difficulty in breathing ..... ( )

g) Difficulty in feeding ..... ( )

h) Indrawing of chest ..... ( )

i) Stridor in calm states ..... ( )

j) Respiratiry rate

i) < 50 per minute ..... ( )

ii) = 50 per minute ..... ( )

iii) > 50 per minute ..... ( )

k) Wheezing ..... ( )

l) Convulsion ..... ( )

B) GENERAL EXAMINATION :

a) Weight of the child (Kg) ..... ( )

b) Throat congestion ..... ( )

c) Ear discharge ..... ( )

d) Temperature ..... ( )

C) SYSTEMIC EXAMINATION OF THE RESPIRATORY SYSTEM :

a) Inspection ..... ( )

b) Palpation ..... ( )

c) Percussion ..... ( )

d) Auscultation ..... ( )

CLINICAL DIAGNOSIS :_____

GOA MEDICAL COLLEGE

DEPT. OF PREVENTIVE & SOCIAL MEDICINE

CHILD HEALTH RECORD

NAME OF THE CHILD:

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